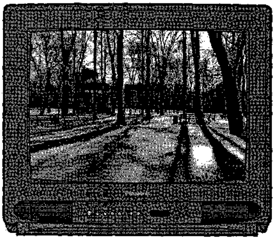
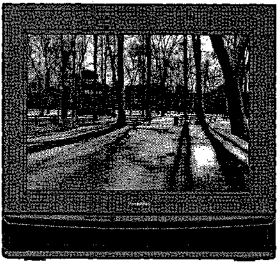
ORDER NO. MTC9606635A1
B5

Service Manual



CT–32S20U



All 35" Receivers

Main Manual
(NA5D)

Panasonic

Models	Chassis
CT–32S20U	ANEDP276
CT–35G21UU	ALEDP278
CT–35G21CU	ALEDP278
CT–35G21U	ALEDP278
CT–35G31UU	AEDP278
CT–35G31U	AEDP278

NOTE: Model **CT–35G21UU** is identical to the **CT–35G21U** and **CT–35G31UU** is identical to the **CT–35G31UU** except for the magnetic field used in the factory to adjust **purity** and **convergence** for different markets.

This Service Manual is issued as a service guide for the models of the NA5D family listed above. Included in this manual are a set of schematics, block diagrams, operations overview, functional descriptions, alignment procedures, disassembly procedures, and a complete parts list.

"**WARNING!** This Service Manual is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. **Products powered by electricity should be serviced or repaired only by experienced professional technicians.** Any attempt to service or repair the product or products dealt with in this Service Manual by anyone else could result in serious injury or death."

The service technician is required to read and follow the "**Safety Precautions**" and "**Important Safety Notice**" in this manual.

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Matsushita Services Company
Division of Matsushita Consumer Electronics Company
A Unit of Matsushita Electric Corporation of America
50 Meadowland Parkway,
Secaucus, New Jersey 07094

Panasonic®

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Important Safety Notice

Special components are used in this television set which are important for safety. These parts are identified on the schematic diagram by the symbol ⚠ and printed in **BOLD TYPE** on the replacement parts list. It is essential that these critical parts are replaced with the manufacturer's specified replacement parts to prevent X–ray radiation, shock, fire or other hazards. Do not modify the original design without the manufacturer's permission.

Safety Precautions

General Guidelines

An **Isolation Transformer** should always be used during the servicing of a receiver whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks. It will also protect the Receiver from being damaged by accidental shorting that may occur during servicing.

When servicing, observe the original lead dress, especially in the high voltage circuit. Replace all damaged parts (also parts that show signs of overheating.)

Always Replace Protective Devices, such as fishpaper, isolation resistors and capacitors, and shields after servicing the Receiver. Use only manufacturer's recommended rating for fuses, circuit breakers, etc.

High potentials are present when this Receiver is operating. Operation of the Receiver without the rear cover introduces danger from electrical shock. Servicing should not be performed by anyone who is not thoroughly familiar with the necessary precautions when servicing high–voltage equipment.

Extreme care should be practiced when **Handling the Picture Tube.** Rough handling may cause it to implode due to atmospheric pressure (14.7 lbs per sq. in.). Do not nick or scratch the glass or subject it to any undue pressure. When handling, use safety goggles and heavy gloves for protection. **Discharge the picture tube** by shorting the anode to chassis ground (not to the cabinet or to other mounting hardware). When discharging, connect cold ground (i.e. dag ground lead) to the anode with a well insulated wire or use a grounding probe.

Avoid prolonged exposure at close range to unshielded areas of the picture tube to prevent exposure to X–ray radiation.

The **Test Picture Tube** used for servicing the chassis at the bench should incorporate safety glass and magnetic shielding. The safety glass provides shielding for the tube viewing area against X–ray radiation as well as implosion. The magnetic shield limits X–ray radiation around the bell of the picture tube in addition to restricting magnetic effects. When using a picture tube test jig for service, ensure that the jig is capable of handling 31kV without causing X–ray radiation.

Before returning a serviced receiver to the owner, the service technician must thoroughly test the unit to ensure that it is completely safe to operate. **Do not use a line isolation transformer when testing.**

Leakage Current Cold Check

Unplug the AC cord and connect a jumper between the two plug prongs.

Measure the resistance between the jumpered AC plug and exposed metallic parts such as screwheads, antenna terminals, control shafts, etc. If the exposed metallic part has a return path to the chassis, the reading should be between 240kΩ and 5.2MΩ. If the exposed metallic part does not have a return path to the chassis, the reading should be infinite.

Leakage Current Hot Check (See Figure 1)

Plug the AC cord directly into the AC outlet. Do not use an isolation transformer during the check.

Connect a 1.5kΩ 10 watt resistor in parallel with a 0.15µF capacitor between an exposed metallic part and ground. Use earth ground, for example a water pipe.

Using a DVM with a 1000 ohms/volt sensitivity or higher, measure the AC potential across the resistor.

Repeat the procedure and measure the voltage present with all other exposed metallic parts.

Verify that any potential does not exceed 0.75 volt RMS. A leakage current tester (such as a Simpson Model 229, Sencore Model PR57 or equivalent) may be used in the above procedure, in which case any current measure must not exceed 1/2 milliamp. If any measurement is out of the specified limits, there is a possibility of a shock hazard and the Receiver must be repaired and rechecked before it is returned to the customer.

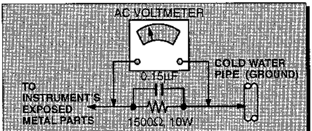

Figure 1. Hot Check Circuit

X–ray Radiation

WARNING: The potential source of X–ray radiation in TV sets is in the High Voltage section and the picture tube.

Note: *It is important to use an accurate, calibrated high voltage meter.*

Set the **brightness, picture, sharpness** and **color** controls to Minimum.

Measure the High Voltage. The high voltage should be 29.25kV±1.25kV for 32" Receivers and 31.5kV±1.25kV for 35" Receivers. If the upper limit is out of tolerance, immediate service and correction is required to insure safe operation and to prevent the possibility of premature component failure.

Horizontal Oscillator Disable Circuit Test

This test must be performed as a final check before the Receiver is returned to the customer. See **Horizontal Oscillator Disable Circuit Procedure Check** in this manual.

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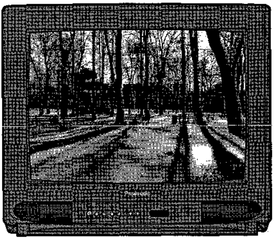
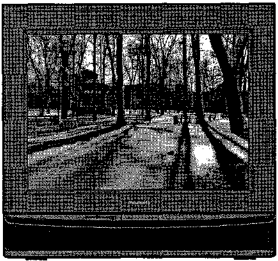
Service Manual



CT–32S20U



All 35" Receivers

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3234

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Using a DVM with a 1000 ohms/volt sensitivity or higher, measure the AC potential across the resistor.

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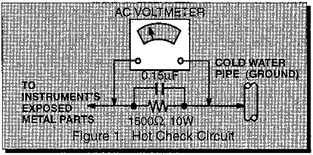

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Horizontal Oscillator Disable Circuit Test

This test must be performed as a final check before the Receiver is returned to the customer. See **Horizontal Oscillator Disable Circuit Procedure Check** in this manual.

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Service Notes

NOTE: ***These components are affixed with glue. Be careful not to break or damage any foil under the component or at the pins of the ICs when removing. Usually applying heat to the component for a short time while twisting with tweezers will break the component loose.***

Leadless Chip Components (surface mount)

Chip components must be replaced with identical chips due to critical foil track spacing. There are no holes in the board to mount standard transistors or diodes. Some chip capacitor or resistor board solder pads may have holes through the board, however the hole diameter limits standard resistor replacement to 1/8 watt. Standard capacitors may also be limited for the same reason. It is recommended that identical components be used.

Chip resistors have a three digit numerical resistance code – 1st and 2nd significant digits and a multiplier. Example: 162 = 1600 or 1.6kΩ resistor, 0 = 0Ω (jumper).

Chip capacitors generally do not have the value indicated on the capacitor. The color of the component indicates the general range of the capacitance.

Chip transistors are identified by a two letter code. The first letter indicates the type and the second letter, the grade of transistor.

Chip diodes have a two letter identification code as per the code chart and are a dual diode pack with either common anode or common cathode. Check the parts list for correct diode number.

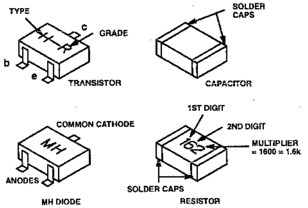
Component Removal

1. Use solder wick to remove solder from component end caps or terminals.
2. Without pulling up, carefully twist the component with tweezers to break the adhesive.
3. Do not reuse removed leadless or chip components since they are subject to stress fracture during removal.

Chip Component Installation

1. Put a small amount of solder on the board soldering pads.
2. Hold the chip component against the soldering pads with tweezers or with a miniature alligator clip and apply heat to the pad area with a 30 watt iron until solder flows. Do not apply heat for more than 3 seconds.

Chip Components

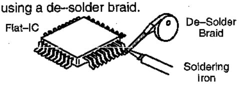

TYPE
C
GRADE
b
e
TRANSISTOR
SOLDER CAPS
CAPACITOR
1ST DIGIT
2ND DIGIT
MULTIPLIER = 1600 = 1.6k
162
COMMON CATHODE
MH
ANODES
MH DIODE
SOLDER CAPS
RESISTOR

How to Replace Flat–IC

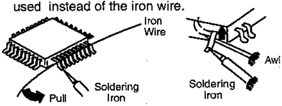
– Required Tools –

- Soldering iron
- De–solder braids
- Iron wire or small awl
- Magnifier

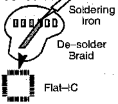
1. Remove the solder from all of the pins of a Flat–IC by using a de–solder braid.


Flat–IC
De–Solder Braid
Soldering Iron

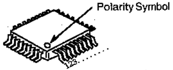
2. Put the iron wire under the pins of the Flat–IC and pull it in the direction indicated while heating the pins using a soldering iron. A small awl can be used instead of the iron wire.


Iron Wire
Soldering Iron
Pull
Awl
Soldering Iron

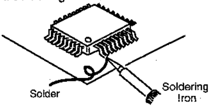
3. Remove the solder from all of the pads of the Flat–IC by using a de–solder braid.


Soldering Iron
De–solder Braid
Flat–IC

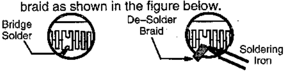
4. Position the new Flat–IC in place (apply the pins of the Flat–IC to the soldering pads where the pins need to be soldered). Properly determine the positions of the soldering pads and pins by correctly aligning the polarity symbol.


Polarity Symbol

5. Solder all pins to the soldering pads using a fine tipped soldering iron.


Solder
Soldering Iron

6. Check with a magnifier for solder bridge between the pins or for dry joint between pins and soldering pads. To remove a solder bridge, use a de–solder braid as shown in the figure below.


Bridge Solder
De–Solder Braid
Soldering Iron

Service Notes (Continued)

IMPORTANT: To protect against possible damage to the solid state devices due to arcing or static discharge, make certain that all ground wires and CRT DAG wire are securely connected.

CAUTION: The power supply circuit is above earth ground and the chassis cannot be polarized. Use an isolation transformer when servicing the Receiver to avoid damage to the test equipment or to the chassis. Connect the test equipment to the proper ground (⏚) or (⊥) when servicing, or incorrect voltages will be measured.

WARNING: This Receiver has been designed to meet or exceed applicable safety and X–ray radiation protection as specified by government agencies and independent testing laboratories.

To maintain original product safety design standards relative to X–ray radiation and shock and fire hazard, parts indicated with the symbol ⚠ on the schematic must be replaced with identical parts. Order parts from the manufacturer's parts center using the part numbers shown in this service manual, or provide the chassis number and the part reference number.

For optimum performance and reliability, all other parts should be replaced with components of identical specifications.

Horizontal Oscillator Disable Circuit

This chassis employs a special circuit to protect against excessive high voltage and beam current. If, for any reason, the high voltage and beam current exceed a predetermined level this protective circuit activates and detunes the horizontal oscillator that limits the high voltage.

The over–voltage protection circuit is not adjustable. However, if components indicated by the symbol ⚠ on the schematic in either the horizontal sweep system or the over–voltage protection circuit itself are changed, the operation of the circuit should be checked using the following procedure.

Equipment needed to check the disable circuit:

1. Voltmeter (0 – 200V scale)
2. High Voltage Meter (0 – 50kV)
3. Variac or Isolation Transformer

Procedure:

1. Tune in a station to verify that the horizontal is in sync.
2. Obtain a Monoscope pattern or a signal generator crosshatch pattern.
3. Connect the voltmeter (–) lead to TPD2 and the (+) lead to TPD1 (junction of D555 anode, R556 & R557). Set **Bright** level to (0) and **Picture** for a 0.9 volt reading on the voltmeter.
4. Turn the Receiver OFF. Connect the resistor jig as shown in Figure 2, between IC801 pin1 and pin 2. The variable resistor should be set to **maximum** resistance.

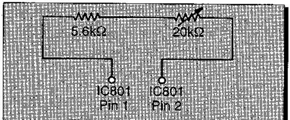


Figure 2. **Resistor Jig**

5. Turn the Receiver On. Slowly reduce the variable resistor resistance until the horizontal sync frequency abruptly increases. Connect the high voltage meter to the CRT 2nd anode (H.V. button). ***Note:*** *Use Dag Ground (C11 or C17 for 35" Receivers and C10 for 32" Receivers on the CRT Board) to connect the (–) lead of the meter.*
6. Verify that that high voltage measured is below 37.8kV for a 32" Receiver, and below 39.5kV for a 35" Receiver, at the point where the frequency starts to change. If the high voltage is not within the specified limit, the cause must be determined and corrected before the Receiver is returned to the customer.

Receiver Feature Table

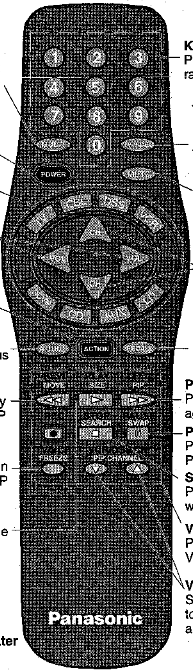
FEATURE \ MODEL	CT-32S20U	CT-35G21CU/U/UU	CT-35G31U/UU
Chassis	NA5D	NA5D	NA5D
# of channels / Phase	181 / PH22	181 / PH22	181 / PH22D
Menu language	ENG / SP / FR	ENG / SP / FR	ENGLISH / FRENCH
Closed Caption	X	X	X
# of PIP tuners	1T	1T	2T
75 Ω input	X	X	X
Remote Model #	TNQ2AE002	TNQ2AE007	TNQ2AE006
Picture tube	M80JUA061X	A89LFL50X	A89LFL50X
Black face regular tube	X	X	X
Comb filter	Glass	Glass	Glass
Notch filter	X	X	X
V/A norm (X=both)	X	X	X
MTS/SAP/DBX	X	X	X
Built-in audio power	3.5W X 2 (10%)	3.5W X 2 (10%)	3.5W X 2 (10%)
# of speakers	2	2	2
Bass / Balance / Treble control	X	X	X
AI sound (simple)	X	X	X
Surround sound	N/A	N/A	X
A/V in (rear/front)	2/0	2/0	2/0
Fixed audio out	X	X	X
Variable audio out	X	X	X
S-VHS input (rear/front)	1/0	1/0	1/0
Dimensions mm (WxHxD) in	861 x 676 x 532 33.9 x 26.6 x 21.0	889.4 x 793 x 620.2 35.0 x 31.2 x 24.4	889.4 x 793.2 x 620.2 35.0 x 31.2 x 24.4
Weight (kb / lb)	52 / 114.5	78 / 172	78 / 172
Power soruce (V / Hz)	120 / 60	120 / 60	120 / 60
Power consumption, Max (A)	2.2	2.2	2.3
Anode voltage	29.25kV ± 1.25kV	31.5kV ± 1.25kV	31.5kV ± 1.25kV
Video input jack	$1V_{p-p}$ 75Ω, phono jack	$1V_{p-p}$ 75Ω, phono jack	$1V_{p-p}$ 75Ω, phono jack
Audio input jack	500mV RMS, 47kΩ	500mV RMS, 47kΩ	500mV RMS, 47kΩ
To audio out jack	0~2.0V RMS, 4.7kΩ	0~2.0V RMS, 4.7kΩ	0~2.0V RMS, 4.7kΩ
"A"-Board TNPH0042	AH	AL	AK
"C"-Board TNPA0203	AA	N/A	N/A
"C"-Board TNPA0355	N/A	AB	AB
"L"-Board TNP111504	N/A	CZ	CZ
"X"-Board TNPA0205	AB	AB	AA
"R"-Board TNP111805	Original	N/A	N/A
"S"-Board TNPA0190	N/A	N/A	AB
"Y"-Board TNP111804	DZ	DZ	DZ
"Z"-Board 0NP19080	AZ	DZ	DZ

Table 1. **Receiver Features**

Location of Controls for the Remote Unit

Basic Remote Control Functions For Television Operation

The following is an overview of the Remote Control unit **for television operation. Ensure the TV mode is selected by initially pressing** TV. Please refer to the indicated pages for additional information.



Multi Button
Programmable to operate up to six Remote Function buttons simultaneously.

Power Button
Press to turn the TV ON or OFF.

Mode Selection Buttons
Select the operation mode for the remote control.

Volume Buttons
Press to adjust TV sound level. Use with Channel buttons to navigate in menus.

Action Button
Press to display Main Menu and access or exit On Screen feature and Adjustment Menus.

R–Tune (Rapid Tune) Button
Press to switch to the previous channel.

PIP Move Button
Press to position PIP frame to any corner of the Main Picture (when PIP frame is displayed).

PIP Freeze Button
Press to stop action in the Main Picture or PIP frame (when the PIP frame is displayed).

PIP Size Button
Press to select size of PIP frame (when the PIP frame is displayed).

Keyboard "0 through 9" Buttons
Press desired channel number to randomly access any channel.

TV/Video Button
Press to select TV or one of two (2) Video Inputs, for the Main Picture or the PIP frame (when the PIP frame is displayed).

Mute Button
Press to mute sound. A second press resumes sound.

Channel Buttons
Press to select channels. Use with Volume buttons to navigate in menus.

Recall Button
Press to display Time, status of Sleep Timer, Channel, Video Mode, Channel Caption (Station Identifier) and Audio Mode.

PIP (Picture In Picture) Button
Press to display the PIP frame, press again to remove PIP frame.

PIP Swap Button
Press to interchange PIP frame with Main Picture (when the PIP frame is displayed).

SEARCH Button
Press to automatically scan channels within the PIP frame.

VCR Function Buttons
Programmable to operate many brands of VCR's.

VCR/DSS (PIP) Channel Buttons
Select VCR or DSS Up/Down channels, or to move Up/Down channel selection within a PIP frame.

Figure 3. **TNQ2AE006 – Home Theater Remote Control**

Helpful Hints:

If the selected component does not respond to the remote control, ensure that the proper mode is selected. **First**, press the **Mode Selection Button** that corresponds to that component. For example, after first pressing the TV Mode Button, the remote will remain in the TV mode for the following commands. If a different mode button is pressed while operating the television, the TV mode button must be pressed again to enable the TV mode control.

Note:
For additional information on the Remote Control, please refer to the Remote Control Quick Reference Functional Key Chart. (pages 10 and 11)

Location of Controls for the Remote Unit

Basic Remote Control Functions For Television Operation

The following is an overview of the Remote Control unit **for television operation. Ensure the TV mode is selected by initially pressing** TV. Please refer to the indicated pages for additional information.

Multi Button
Programmable to operate up to six Remote Function buttons simultaneously.

Power Button
Press to turn the TV ON or OFF.

Mode Selection Buttons
Select the operation mode for the remote control.

Volume Buttons
Press to adjust TV sound level. Use with Channel buttons to navigate in menus.

Action Button
Press to display Main Menu and access or exit On Screen feature and Adjustment Menus.

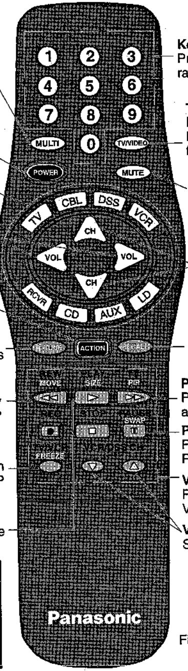
R–Tune (Rapid Tune) Button
Press to switch to the previous channel.

PIP Move Button
Press to position PIP frame to any corner of the Main Picture (when PIP frame is displayed).

PIP Freeze Button
Press to stop action in the Main Picture or PIP frame (when the PIP frame is displayed).

PIP Size Button
Press to select size of PIP frame (when the PIP frame is displayed).

To prolong the life of the batteries, the illumination of the keys can be toggled ON and OFF by pressing the R–TUNE and the RECALL buttons simultaneously.



Keyboard "0 through 9" Buttons
Press desired channel number to randomly access any channel.

TV/Video Button
Press to select TV or one of two (2) Video Inputs, for the Main Picture or the PIP frame (when the PIP frame is displayed).

Mute Button
Press to mute sound. A second press resumes sound.

Channel Buttons
Press to select channels. Use with Volume buttons to navigate in menus.

Recall Button
Press to display Time, status of Sleep Timer, Channel, Video Mode, Channel Caption (Station Identifier) and Audio Mode.

PIP (Picture In Picture) Button
Press to display the PIP frame, press again to remove PIP frame.

PIP Swap Button
Press to interchange PIP frame with Main Picture (when the PIP frame is displayed).

VCR Function Buttons
Programmable to operate many brands of VCR's.

VCR/DSS Channel Buttons
Select VCR or DSS Up/Down channels.

ONE TUNER, ILLUMINATED REMOTE, NO PIP SEARCH, NO UP OR DOWN CHANNEL SCAN.

Figure 4. **TNQ2AE002 – Home Theater Remote Control – Illuminated**

Helpful Hints:
If the selected component does not respond to the remote control, ensure that the proper mode is selected. **First**, press the **Mode Selection Button** that corresponds to that component. For example, after first pressing the TV Mode Button, the remote will remain in the TV mode for the following commands. If a different mode button is pressed while operating the television, the TV mode button must be pressed again to enable the TV mode control.

Note:
For additional information on the Remote Control, please refer to the Remote Control Quick Reference Functional Key Chart. (pages 10 and 11)

Location of Controls for the Remote Unit

Basic Remote Control Functions For Television Operation

The following is an overview of the Remote Control unit for television operation. **Ensure the TV mode is selected by initially pressing** . Please refer to the indicated pages for additional information.

Multi Button
Programmable to operate up to six Remote Function buttons simultaneously.

Power Button
Press to turn the TV ON or OFF.

Mode Selection Buttons
Select the operation mode for the remote control.

Volume Buttons
Press to adjust TV sound level. Use with Channel buttons to navigate in menus.

Action Button
Press to display Main Menu and access or exit On Screen feature and Adjustment Menus.

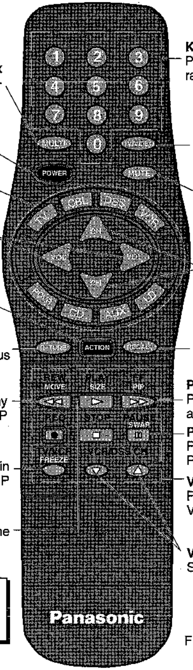
R–Tune (Rapid Tune) Button
Press to switch to the previous channel.

PIP Move Button
Press to position PIP frame to any corner of the Main Picture (when PIP frame is displayed).

PIP Freeze Button
Press to stop action in the Main Picture or PIP frame (when the PIP frame is displayed).

PIP Size Button
Press to select size of PIP frame (when the PIP frame is displayed).

ONE TUNER, NON–ILLUMINATED REMOTE, NO PIP SEARCH, NO UP OR DOWN CHANNEL SCAN.



Keyboard "0 through 9" Buttons
Press desired channel number to randomly access any channel.

TV/Video Button
Press to select TV or one of two (2) Video Inputs, for the Main Picture or the PIP frame (when the PIP frame is displayed).

Mute Button
Press to mute sound. A second press resumes sound.

Channel Buttons
Press to select channels. Use with Volume buttons to navigate in menus.

Recall Button
Press to display Time, status of Sleep Timer, Channel, Video Mode, Channel Caption (Station Identifier) and Audio Mode.

PIP (Picture In Picture) Button
Press to display the PIP frame, press again to remove PIP frame.

PIP Swap Button
Press to interchange PIP frame with Main Picture (when the PIP frame is displayed).

VCR Function Buttons
Programmable to operate many brands of VCR's.

VCR/DSS Channel Buttons
Select VCR or DSS Up/Down channels.

Figure 5. **TNQ2AE007– Home Theater Remote Control**

Helpful Hints:

If the selected component does not respond to the remote control, ensure that the proper mode is selected. **First**, press the **Mode Selection Button** that corresponds to that component. For example, after first pressing the TV Mode Button, the remote will remain in the TV mode for the following commands. If a different mode button is pressed while operating the television, the TV mode button must be pressed again to enable the TV mode control.

Note:
For additional information on the Remote Control, please refer to the Remote Control Quick Reference Functional Key Chart. (pages 10 and 11)

Remote Control Quick Reference Functional Key Chart
(Not all keys/functions are available on all Remotes)

KEY	MODE	FUNCTION
1 2 3 4 5 6 7 8 9 0	**TV** **VCR** **CABLE/DSS**	Selects Channel Selects Channel Selects Channel
	RECEIVER/AMPLIFIER	① Selects TV Video 1 ② Selects TV Video 2 ③ Selects TV Video 3 ④ Selects Tuner ⑤ Selects CD Player ⑥ Selects Tape Cassette Player ⑦ VCR 1 ⑧ VCR 2 ⑨ VCR 3
	CD PLAYER	Selects Track Number
	LD PLAYER	Selects Track Number
MULTI	**ALL COMPONENTS**	Programmable Button That Can Operate Up To Six Remote Functions at once
TV/VIDEO	**TV**	Selects the TV Input Mode
POWER	**ALL COMPONENTS**	Turns On and Off Selected Components
MUTE	**TV, DSS, VCR, LDP** **CABLE** **RECEIVER/AMPLIFIER**	Mutes TV Audio Mutes Audio Mutes Audio
TV	**TV**	TV Mode Selection for Remote Control
CBL	**CABLE**	Cable Mode Selection for Remote Control
DSS	**DSS (DIGITAL SATELLITE SYSTEM)**	DSS Mode Selection for Remote Control
VCR	**VCR**	VCR Mode Selection for Remote Control
RCVR	**RECEIVER/AMPLIFIER**	Receiver/Amplifier Mode Selection for Remote Control
CD	**COMPACT DISC**	CD Mode Selection for Remote Control
AUX	**CASSETTE PLAYER, DVD**	AUX Mode Selection for Remote Control Enables User to Operate a Tape Cassette Player, or Digital Video Disc
LD	**LASER DISC PLAYER**	LD Mode Selection for Remote Control
CH CH	**TV** **CABLE** **DSS** **LDP** **CD** **RECEIVER/AMPLIFIER** **DVD**	Channel Up/Down, Menu Navigation Channel Up/Down DSS Guides and Menus Navigation Skip FF, REW Preset or Tuning Frequency Skip FWD / Skip REW
VOL VOL	**TV** **CABLE** **DSS** **RECEIVER/AMPLIFIER** **VCR** **LDP**	Volume Up/Down, Menu Navigation Volume Up/Down DSS Guides and Menus Navigation Volume Up/Down TV Volume Up/Down TV Volume Up/Down

Figure 6. **Remote Control Quick Reference Functional Key Chart**

Remote Control Quick Reference Functional Key Chart
(Not all keys/functions are available on all Remotes)

KEY	MODE	FUNCTION
R-TUNE	**LDP**	Side A/B
	TV	Selects Previously Tuned Channel
	CABLE	Selects Previously Tuned Channel
	VCR	Selects Previously Tuned Channel
	DSS	Selects Previously Tuned Channel
	RECEIVER/AMPLIFIER	Switches between AM and FM
	CD	Selects Next Disc
	TAPE CASSETTE PLAYER	Selects Tape Cassette Player A or B
ENTER ACTION	**TV**	Activates TV Menus
	DSS	Acts as Menu Button for DSS
RECALL	**TV**	Displays Channel, Time, and Audio Mode
	DSS	Displays Current DSS Settings
	VCR	Displays Current VCR Settings
	LDP	Displays Current LDP Settings
REW ◄◄	**TV**	PIP Move
	DSS	DSS Guide
	VCR	Rewind
	LDP	Rewind
	TAPE	Rewind
	CD	Selects Previous Track
	DVD	Rewind
PLAY ►	**TV**	PIP Size
	DSS	Enter/Select
	VCR	Play
	LDP	Play
	TAPE	Play (in Normal Direction)
	CD	Play
	DVD	Play
FF ►►	**TV**	PIP On/Off
	DSS	Exit/Clear
	VCR	Fast Forward
	LDP	Fast Forward
	TAPE	Fast Forward
	CD	Selects Next Track
	DVD	Fast Forward
REC ●	**DSS**	One Touch Record in DSS Mode
	VCR	Record
	TAPE	Record
	CABLE	VCR Record
STOP ■	**TV**	PIP Search
	DVD	Stop
	VCR	Stop
	LDP	Stop
	TAPE	Stop
	CD	Stop
	CABLE	VCR Stop
PAUSE ❚❚	**DVD**	Pause
	TV	PIP Swap
	VCR	Pause
	LDP	Pause
	TAPE	Pause
	CD	Pause
	CABLE	VCR Pause
TV/VCR	**TV**	PIP Freeze
	VCR	Selects TV/VCR Mode
	DSS	Selects TV/DSS Mode
	CABLE	Selects TV/VCR Mode
VCR/DSS CH ▼ ▲	**TV**	PIP Channel Up/Down (2 Tuner PIP Models Only)
	VCR	Channel Up/Down
	DSS	Channel Up/Down
	CABLE	VCR Up/Down

Figure 7. **Remote Control Quick Reference Functional Key Chart – Continued**

Location of Controls (Receiver)

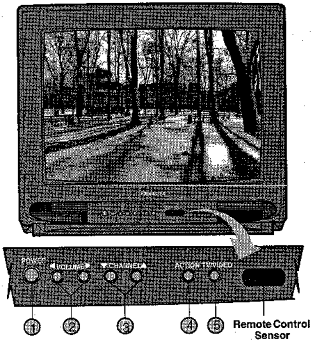

POWER
◄VOLUME►
▼CHANNEL▲
ACTION
TV/VIDEO
①
②
③
④
⑤
Remote Control Sensor

Figure 8. **Front Control Panel (CT-32S20U)**

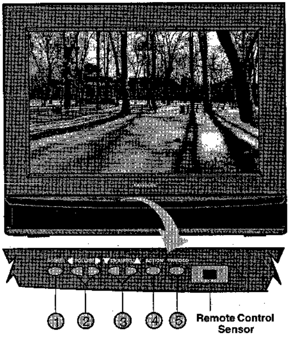

POWER
◄VOLUME►
▼CHANNEL▲
ACTION
TV/VIDEO
①
②
③
④
⑤
Remote Control Sensor

Figure 9. **Front Control Panel (all 35" models)**

Quick Reference Control Operation

Quick Reference Control Operation

① **Power Button –** Press to turn ON or OFF.

② **Volume Buttons** – Press to adjust Sound Level, or to adjust Audio Menus, Video Menus, and select operating features when menus are displayed.

③ **Channel Buttons –** Press to select programmed channels. Press to highlight desired features when menus are displayed. Also used to select Cable Converter box channels after programming Remote Control Infra–red codes (the TV/AUX/CABLE switch must be set in CABLE position).

④ **Action Button –** Press to display Main Menu and access On Screen feature and Adjustment Menus.

⑤ **TV/Video Button –** Press to select TV or one of two Video Inputs, for the Main Picture or the PIP frame (when PIP frame is displayed).

Main Menu Icons Selection

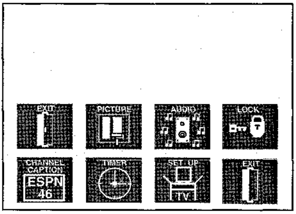

EXIT
PICTURE
AUDIO
LOCK
CHANNEL CAPTION
ESPN 46
TIMER
SET UP
TV
EXIT

Figure 10. **Main Menu Icons**

Figure 11. **Displays and Exits Menus**

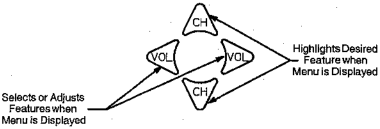

CH
VOL
VOL
CH
Highlights Desired Feature when Menu is Displayed
Selects or Adjusts Features when Menu is Displayed

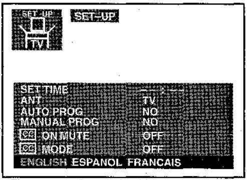
Figure 12. **Controls for Menu Icon Selection** (located on Remote Control)

1. Press the ACTION button to display the Main Menu.
2. Press the CH ▲ or ▼ button and the VOL ◀ or ▶ button to move from one icon to another. The selected Icon will be indicated in Red. Press the VOL buttons to move horizontally and the CH buttons to move vertically.
3. Press the ACTION button after selecting the desired Icon.
4. Select the EXIT Icon, then press the ACTION button to exit.

Bilingual and Trilingual Menu Selection

The Language Menu is factory set to ENGLISH. Follow these instructions to change the Language Menu to Spanish, French and back to English (CT–35G31U/UU is bilingual – ENGLISH or FRENCH only. Ignore references to Spanish (Espanol) in this section).

1. Press the ACTION button to display the Main Menu.
2. Press the CH ▲ or ▼ button and VOL ◀ or ▶ button to highlight the SET–UP Icon.
3. Press the ACTION button to display the SET–UP Menu.


SET UP
TV
SET–UP

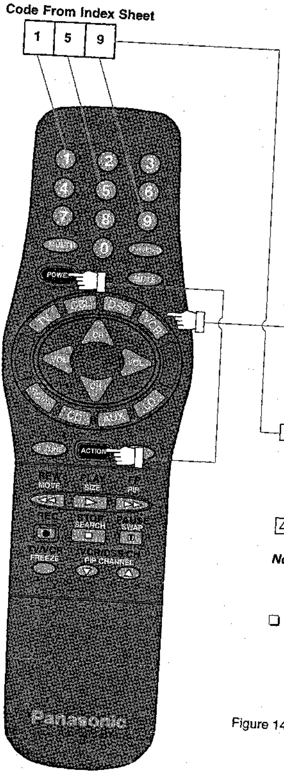
SET TIME --:--
ANT TV
AUTO PROG NO
MANUAL PROG NO
CC ON MUTE OFF
CC MODE OFF
ENGLISH ESPANOL FRANCAIS

Figure 13. **Setup for Menu Language**

4. Press the CH ▲ or ▼ button to highlight ENGLISH ESPANOL FRANCAIS.
5. Press the VOL ◀ or ▶ button to select ENGLISH ESPANOL or FRANCAIS.
6. Press the ACTION button twice to exit Menus.

Programming The Remote Control Using Access Codes

The remote control can be set and used with other manufacturers components, by utilizing the **MODE SELECTION BUTTONS** for **CABLE**, **DSS**, **VCR**, **RCVR** (a **Receiver** or **Amplifier**), **CD**, **LD**, and **AUX** (for **Cassette Players** or a **DVD**.)


Code From Index Sheet
1
5
9
1
2
3
4
5
6
7
8
9
MUTE
0
R-TUNE
POWER
MUTE
TV
CBL
DSS
VCR
CH
VOL
VOL
CH
RCVR
CD
AUX
LD
TV/VIDEO
ACTION
REW
MOVE
PLAY
SIZE
FF
PIP
REC
STOP
SEARCH
PAUSE
SWAP
TV/VCR
FREEZE
VCR/DSS CH
PIP CHANNEL
Panasonic

Preferred Procedure – Code Known

Procedure for setting up the remote using the numerical buttons.

☐ Determine brand of component.

☐ Identify code(s) associated with the brand in the infrared code index (located in this manual on pages 15 thru 18). Record all possible codes.

☐ Confirm that the device is plugged in and operating properly, then turn it OFF.

1 **For a NON–ILLUMINATED remote:**
Press and hold the ACTION button and the POWER button simultaneously for at least 5 seconds.

FOR an ILLUMINATED REMOTE:
Press and hold the ACTION button and the POWER button simultaneously for at least 5 seconds. All of the Mode buttons will flash.

2 **For a NON–ILLUMINATED remote:**
Press the desired Mode button.

For an ILLUMINATED remote:
Press the desired Mode button. That Mode button will illuminate steadily. All other buttons will go out.

3 **Enter the three digit code, by using the Remote Control Keyboard "0 through 9" buttons.**

For an ILLUMINATED remote – If the proper code was entered, the Mode key will blink twice then go out.

4 **Press POWER to send a test signal. If the code is correct, the selected component will turn on.**

Note: *Some brands may have multiple codes. If the component does not respond, repeat the procedure using each listed code until the device responds correctly.*

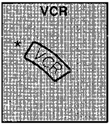
☐ If an incorrect code is entered or entry of the code is not completed within 30 seconds, the previous settings will be maintained. For illuminated remote, the Mode key illuminated will go out.

Figure 14. **Remote Control – Programming**

VCR Infrared Codes Index

The Universal Infrared Remote Control is capable of operating many brands of VCRs. Refer to page 14 for programming procedures.

Note: *The Universal Remote Control memory is limited. Some models of VCRs may not operate. The Universal Remote Control is not designed to control all features that are available in all models.*
After entering the proper infrared code, press the Remote ***VCR*** *Selection Mode button (*). To operate the Remote VCR function buttons, refer to pages 10 and 11 for Remote Control Key Functions.*



Code Index For VCRs

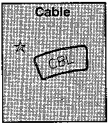
VCR Brand	Code(s)
Adventura	000
Aiko	278
Aiwa	000
Akai	041, 061
American High	035
Asha	240
Audiovox	037
Beaumark	240
Bell & Howell	104
Broksonic	121,184
Calix	037
Canon	035
Carver	081
CCE	072, 278
Citizen	037, 278
Colt	072
Craig	037, 047, 072, 240
Curtis Mathes	035, 041, 060
Cybernex	240
Daewoo	045, 278
Dynatech	000
Electrohome	037
Electrophonic	037
Emerex	032
Emerson	000, 002, 037, 043, 061, 121, 184, 278
Fisher	047, 104
Fuji	033, 035
Funai	000
Garrard	000
GE	035, 060
Goldstar	037, 038
Gradiente	000
Harley Davidson	000
Harman/kardon	038
Harwood	072
Headquarter	046
HI–Q	047
Hitachi	041, 042
Jensen	041
JVC	041, 067
Kenwood	038, 041, 067
KLH	072
Kodak	035, 037
Lloyd	000
Logik	072
LXI	037
Magnavox	035, 039, 081
Magnin	240
Marantz	035, 081
Marta	037
Matsushita	035
MEI	035
Memorex	000, 035, 037, 039, 046, 047, 048, 104 240
MGA	043, 061
MGN Technology	240
Minolta	042
Mitsubishi	043, 061, 067
Motorola	035, 048
MTC	000, 240
Multitech	000, 072
NEC	038, 041, 067
Nikko	037
Noblex	240
Olympus	035
Optimus	037, 048, 104
Panasonic	035, 162, 225, 454
Penney	035, 037, 038, 042 240
Pentax	042
Philco	035
Philips	035, 081
Pilot	037
Pioneer	067
Protec	072
Pulsar	039
Quarter	046
Quartz	046
Quasar	035
Radio Shack	000, 037
Radix	037
Randex	037
RCA	042, 060
Realistic	000, 035, 037, 046 047, 048, 104, 240
Ricoh	034
Runco	039
Samsung	045, 240
Sanky	039, 048
Sansui	041, 067
Sanyo	046, 047, 104, 240
Scott	043, 045, 121, 184
Sears	035, 037, 042, 046, 047,104
Sharp	048
Shintom	072
Shogun	240
Singer	072
Sony	032, 033, 034, 035
STS	042
Sylvania	000, 035, 043, 081
Symphonic	000
Tatung	041
Teac	000, 041
Technics	035,162
Teknika	000, 035, 037
TMK	240
Toshiba	043, 045
Totevision	037, 240
Unitech	240
Vector	045
Vector Research	038
Video Concepts	045, 061
Videosonic	240
Wards	000, 035, 042, 047, 048, 072, 240
XR–1000	000, 035, 072
Yamaha	038
Zenith	033, 034, 039

Table 2. **VCR Codes**

CABLE CONVERTER BOX AND CD PLAYERS
Infrared Codes Index

The Universal Infrared Remote Control is capable of operating many brands of Cable Converter Boxes, and CD Players. Refer to page 14 for programming procedures.

Note: *The Universal Remote Control memory is limited. Some models of Cable Converter Boxes and CD Players may not operate. The Universal Remote Control is not designed to control all features that are available in all models. After entering the proper infrared code, press the Remote **CBL** Selection Mode button (☆). To operate the Remote Cable function buttons, refer to pages 10 and 11 for Remote Control Key Functions.*

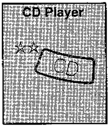


Codes For Cable Converter Box

Brand of Cable–TV Box	Code(s)
ABC	003, 007, 008, 011, 013, 014, 017
Archer	153
Century	153
Citizen	153
Contec	019
Dae Ryung	008
Garrard	153
Gemini	015
General Instrument	011, 476
Goldstar	144
Hamlin	009, 020, 259
Hitachi	011
Hytex	007
Jasco	153
Jerrold	003, 011, 012, 014, 015, 476
Memorex	000
Oak	007, 019
Panasonic	000, 021, 107
Paragon	000
Philips	153
Pioneer	144, 533
Pulsar	000
RCA	021
Regal	020, 259
Rembrandt	011
Runco	000
Samsung	144
Scientific Atlanta	008, 017, 477
Signal	015
Signature	011
Sprucer	021
Starcom	003, 015
Stargate	015
Starquest	015
Tocom	012, 013
Toshiba	000
Tusa	015
Unika	153
United Artists	007
United Cable	003
Universal	153
Zenith	000, 525

Table 3. **Cable Converter Box Codes**

Note: *After entering the proper infrared code press the Remote **CD** Selection Mode button (☆☆). To operate the Remote CD Player function buttons, refer to pages 10 and 11 for Remote Control Key Functions.*



Codes For CD Players

Brand of CD Players	Code(s)
Aiwa	124, 157
CA Audio Lab	029
Carver	157
Denon	003
DKK	000
Emerson	305
Fisher	048
Genexxa	032, 305
Harman–Kardon	426
Hitachi	032
JVC	072
Kenwood	028, 037, 048, 190
Krell	157
LXI	305
Magnavox	157
Marantz	029, 157
MCS	029
Mission	157
Nakamichi	147
NSM	157
Onkyo	101
Optimus	000, 032, 037, 305, 426, 468
Panasonic	029, 367
Philips	157
Pioneer	032, 468
Proton	157
QED	157
Quasar	029
RCA	305
Rotel	157
SAE	157
Sansui	157, 305
Scott	305
Sears	305
Sharp	037
Sherwood	426
Sony	000
Technics	029, 303
Victor	072

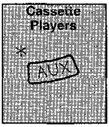
Table 4. **CD Player Codes**

CASSETTE PLAYERS, RECEIVERS, and AMPLIFIERS
Infrared Codes Index

The Universal Infrared Remote Control is capable of operating many brands of Cassette Players, Receivers, or Amplifiers. Refer to page 14 for programming procedures.

Note: *The Universal Remote Control memory is limited. Some models of Cassette Players, Receivers, and Amplifiers may not operate. The Universal Remote Control is not designed to control all features that are available in all models.*

*After entering the proper infrared code, press the Remote **AUX** Selection Mode button (✻). To operate the Remote Cassette Player function buttons, refer to pages 10 and 11 for Remote Control Key Functions.*

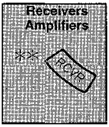


Code Index For Cassette Players

Brand of Cassette Players	Code(s)	Brand of Cassette Players	Code(s)
Aiwa	029	Panasonic	272
Carver	029	Philips	029
Denon	076	Pioneer	027, 220
Kenwood	070	Sansui	029
Magnavox	029	Sherwood	337, 338
Marantz	029	Sony	170, 243
Nakamichi	147	Technics	229
Optimus	027, 220, 337, 338	Wards	027
		Yamaha	094, 097

Table 5. **Cassette Players Codes**

Note: *After entering the proper infrared code, press the Remote **RCVR** Selection Mode button (✻✻). To operate the Remote Receiver or Amplifier function buttons, refer to pages 10 and 11 for Remote Control Key Functions.*



Code Index For Receivers And Amplifiers

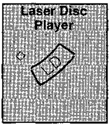
Brand of Receiver / Amplifier	Code(s)	Brand of Receiver / Amplifier	Code(s)
ADC	531	Panasonic	039
Aiwa	121, 158, 189	Penney	195
Carver	008, 042, 189, 269	Philips	189, 269
Casio	195	Pioneer	013, 014, 080, 300, 531
Clarinette	195	Quasar	039
Denon	004	RCA	531
Fisher	042, 219	Realistic	195
JVC	074	Sansui	189, 321
Kenwood	027, 186	Sanyo	219
Lloyd's	195	Sharp	186
Magnavox	189, 195, 269, 531	Sherwood	502
Marantz	039, 189, 269, 321	Sony	158
MCS	039	Technics	039, 208, 308, 309, 518
Modulaire	195	Victor	074
NAD	320	Wards	013, 014, 042, 080, 158, 189
Nakamichi	321, 347	Yamaha	176, 186, 354
Onkyo	135	Yorx	195
Optimus	013, 080, 186, 219, 300, 531		

Table 6. **Receivers & Amplifiers Codes**

LASER DISC, DSS (Digital Satellite System), and DVD (Digital Videodisc) Infrared Codes Index

The Universal Infrared Remote Control is capable of operating selected brands of Laser Disc, DSS Digital Satellite System, and DVD (Digital Videodisc). Refer to page 14 for programming procedures.

Note: *The Universal Remote Control memory is limited. Some models of Laser Disc, DSS Digital Satellite System, and DVD (Digital Videodisc) may not operate. The Universal Remote Control is not designed to control all features that are available in all models.*
After entering the proper infrared code, press the Remote ***LD*** *Selection Mode button (◇). To operate the Remote Laser Disc function buttons, refer to pages 10 and 11 for Remote Control Key Functions.*

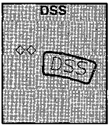


Codes For Laser Disc

Brand of Laser Disc	Code(s)
Mitsubishi	059
NAD	059
Panasonic	204
Pioneer	059
Quasar	204
Sony	201

Table 7. **Laser Disks Codes**

Note: *After entering the proper infrared code, press the Remote* ***DSS*** *Selection Mode button (◇◇). To operate the Remote Satellite function buttons, refer to pages 10 and 11 for Remote Control Key Functions.*

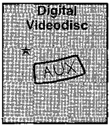


Codes For DSS (Digital Satellite System)

Brand of Satellite	Code(s)
Panasonic	701
RCA	566
Sony	639

Table 8. **Digital Satellite Systems Codes**

Note: *After entering the proper infrared code, press the Remote* ***AUX*** *Selection Mode button (★). To operate the Remote DVD (Digital Videodisc) function buttons, refer to pages 10 and 11 for Remote Control Key Functions.*



Codes For DVD (Digital Videodisc)

Brand of DVD	Code(s)
Panasonic	490

Table 9. **Digital Videodiscs Codes**

Notes

Disassembly for Service

Back Cover

Note: *Configuration, type, and number of screws vary depending on the model of the Receiver serviced and the application; various models are covered in this Manual. Use same hardware when reassembling the receiver.*

1. 4 screws at the top edge of the Receiver.
2. 4 screws at each side of the Receiver.
3. 5 screw around the plastic rear A/V bracket.

Note: *Some boards are mounted on the Main Chassis (A–Board) and require extension cables when servicing. Cable kits are available from Matsushita Service Company, Part No. **TXAZS011SER**.*

A–Board – Main Chassis

1. Secured to the chassis frame with 5 screws.
2. Remove the screws, disconnect the necessary connectors and lift the chassis out of the chassis frame. ***Note:*** *Some tie–wraps that secure the wire dressings may need to be unfastened for chassis removal.*

C–Board – CRT Output

Plugs into the socket on the CRT neck.

R–Board – IR Remote Receiver (CT–32S20U)

Secured to the cabinet escutcheon by plastic clips. Use a small screw driver to lift the clips while pulling the board out.

S–Board – Second Tuner (CT–35G31U/UU)

Located to the left of the chassis frame. The S–Board is secured to the cabinet by three studs with one screw per stud. Each stud is connected to the cabinet with one screw. Remove the studs screws and remove the board.

X–Board – A/V 1 & 2, S–Video, TV Switching, Comb Filter

Connected to the Main Chassis (A–Board). It is the board located at the center of the A–Board. It is connected to the A–Board with 3 connectors. Pull on the X–Board, perpendicular to the A–Board, while releasing the snap tabs on connectors A1, A2 & A3.

Y–Board – PIP Processing

Connected to the Main Chassis (A–Board). It is the board located closest to the left edge of the A–Board. The Y–Board is connected to the A–Board with 2 connectors. Pull on the Y–Board, perpendicular to the A–Board, while releasing the snap tabs on connectors A31 & A32.

Z–Board – Pincushion Correction

Connected to the Main Chassis (A–Board). It is located at the top right corner of the A–Board and it is connected to the A–Board with 1 connector. Pull on the Z–Board, perpendicular to the A–Board, while releasing the snap tabs on connectors A7.

L–Board – Keyboard Push Button Assembly

Secured to the cabinet front with 2 screws.

Speakers

Each speaker is secured to the cabinet's front with 4 screws.

A/V Block

Soldered to the X–Board. It is attached to the rear A/V bracket with 3 screws.

Rear A/V Bracket

Attached to the A/V block with 3 screws, and to the antenna block with 2 screws. The bracket is secured to the chassis frame under 3 tabs.

Antenna Block

Attached to the rear A/V bracket with 2 screws.

Disassembly for CRT Replacement

1. Discharge the CRT as instructed in the **Safety Precautions** (see page 2).
2. Disconnect the yoke (DY) plug ,degaussing coil (DEG) plug and the CRT 2nd anode button from the main board .
3. Remove the C–Board from the CRT base and unplug the black wires (CRT dag ground) C11 & C17 from the board.
4. Disconnect the A11, A12, A41 and SP plugs from the A–Board.
5. Disconnect the connectors attached to the S–Board (S5, S6 & S8 and the wire attached to the tuner).
6. Lift the Main Chassis (A–Board) and all mounted boards completely out with the CRT Board attached.

CRT Replacement

1. Perform **Disassembly for CRT Replacement** procedure.
2. Insure that the CRT H.V. anode button is discharged before handling the CRT. Read the **Safety Precautions** (see page 2) on handling the picture tube.
3. Remove the components from the CRT neck and place the cabinet face down on a soft pad.
4. Note the original order of the CRT mounting hardware as they are removed from the CRT mounting brackets at each corner of the CRT.
5. Remove the CRT with the degaussing coil and the dag ground braid attached.
6. Note the original locations and mounting of the degaussing coil and the dag ground assembly to insure proper reinstallation on the replacement CRT.

   To remove and re–mount the degaussing coil:
   The degaussing coil is held in place by clampers fastened to the CRT corner ears.
   These clampers must be installed onto the replacement CRT prior to mounting the degaussing coil.

   To remove and re–mount the dag ground braid:

   a. Unhook the coil spring from the bottom corners of the CRT ears.
   b. Release the braid loop from the upper corners of the CRT ears.
7. Mount the dag ground braid on the replacement CRT. Position the degaussing coil with new ties. Dress coil as was on the original CRT.
8. Replace the components on the CRT neck and re–install into cabinet. Verify that all ground wires and circuit board plugs get connected.

Chassis Service Adjustment Procedures

All service adjustments are factory preset and should not require adjustments unless controls and/or associated components are replaced.

***Note:** Connect the (–) lead of the voltmeter to the appropriate ground. Use T801 pin F2 or to IC801's heat sink when the HOT ground symbol (⏚) is used. Otherwise, use COLD ground (⏚) — Tuner shield, IC451's heat sink or FA2.*

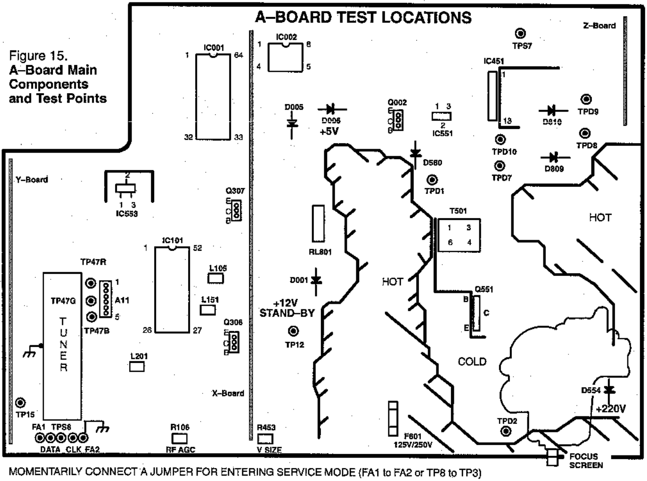

A–BOARD TEST LOCATIONS
Z-Board
Y-Board
X-Board
IC001
1
64
32
33
IC002
1
8
4
5
TPS7
IC451
1
13
D005
D006
+5V
Q002
1 3
2
IC551
D810
TPD9
TPD10
TPD8
D560
TPD7
D809
TPD1
IC553
1 3
2
Q307
T501
1 3
6 4
HOT
IC101
1
52
26
27
RL801
TP47R
L105
D001
HOT
Q551
TP47G
A11
1
5
L151
+12V
STAND–BY
B
C
E
T U N E R
TP47B
Q306
TP12
L201
COLD
D554
+220V
TP15
TPD2
FA1 TPS8
DATA CLK FA2
R106
RF AGC
R453
V SIZE
F801
125V/250V
FOCUS
SCREEN

Figure 15.
A–Board Main Components and Test Points

MOMENTARILY CONNECT A JUMPER FOR ENTERING SERVICE MODE (FA1 to FA2 or TP8 to TP3)

131.0V B+ Voltage Confirmation

1. Set the **Bright** and the **Picture** to Minimum by using the Picture Menu.
2. Connect a DVM between TPD7 or cathode of D809 and cold ground.
3. Confirm that B+ voltage is 131.2V ±2.0V. This voltage supplies B+ to the Horizontal Output & Flyback circuits.

Source Voltage Chart

120V AC line input. Set the **Bright** and the **Picture** to Minimum by using the Picture Menu. Use cold ground (⏚) for the (–) lead of the DVM.

IC553 pin 3	+5.0V ±0.25V
IC551 pin 3	+9.0V ±0.5V
TPD9	+16.5V ±2V
TPD10	+18.0V ±2V
Cathode of D554	+227V ±15V
TPD8	+26.0V ±2V

Adjust Picture menu for normalized video adjustments.

B+ 5V Source Voltages

Volatile 5V:

Tuner BPL, IC101 (B+ V_{CC}), RF AGC (R106).

MPU 5V:

Emitter Q002 = IC001(V_{DD}).

Standby 5V:

Cathode D005, IC001 (Key in 1), I²C EEPROM (IC002), TIMER LED, Remote Receiver.

B+ 9V Source Voltage

Cathode D560 = IC101 (B+ V_{CC}) (HOLD DOWN) (AFC OUT), Q306 (Video), Q307 (Closed Caption E.F.), Tuner (BM).

B+ 12V (Stand–by) *Note: +16V when power is on*

Cathode D001 = RL801 (on–off relay), Q002 (+5V Reg), IC101 (Horiz. Vcc).

High Voltage Check

1. Select an active TV channel and confirm that horizontal is in sync.
2. Adjust Brightness and Picture using Picture Icon menu so video just disappears.
3. Confirm B+ 131V is within limit.
4. Using a high voltage meter confirm that the High Voltage is 29.25kV ±1.25kV or 31.5kV ±1.25kV for 32" or 35" Receivers respectively.

Purity and Convergence Procedure

Adjustment is necessary only if the CRT or the deflection yoke is replaced or if the setting was disturbed. The complete procedure consists of:

1. Initial static convergence.
2. Setting the purity.
3. Final static convergence.

When the CRT or the Yoke is Replaced

Place the yoke on the CRT neck (do not tighten the clamp).

For a 2–piece assembly (see Figure 16):

Position purity/convergence assembly as shown and tighten clamp snugly. Cut the hot–melt glue seal on assembly and place like tabs of purity device together at 12 o'clock to reduce its magnetic field effect. Manually degauss the CRT.

Turn the Receiver ON and slide the deflection yoke back and forth on the neck of the CRT. Stop at the position that produces a near white, uniform raster.

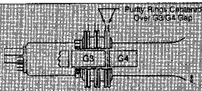


Figure 16. **Positioning of Purity/Convergence Assembly (2–piece assembly)**

For a 1–piece assembly (see Figure 17):

Place like tabs of purity devices together at 12 O'Clock to reduce any magnetic field effect. Manually degauss the set.

Connect a Black/White pattern generator and tune the receiver to the signal. Slide the deflection yoke & purity ring assembly back and forth on the CRT neck. Stop at a position that produces a near white signal.

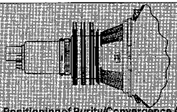


Figure 17. **Positioning of Purity/Convergence Assembly (1–piece assembly)**

Initial Center Static Convergence

Connect a dot/crosshatch generator to the Receiver and tune in signal. Observe misconvergence at center of the screen only.

Adjust the 4 pole magnet (center rings); separate tabs and rotate to converge blue with red.

Adjust the 6 pole magnet (rear rings): separate tabs and rotate to converge blue and red (magenta) with green. ***Note:*** *Precise convergence at this point is not important.*

Purity Adjustment

When the Receiver is in the Serviceman Mode for making electronic adjustments, press the **Recall** button on the Remote Control to enter Purity Check. (See **Service Adjustments Electronic Controls.**)

Operate the Receiver for 60 minutes using the first Purity check field (white screen) to stabilize the CRT.

Fully degauss the Receiver by using an external degaussing coil.

Press the **Recall** button on the Remote Control again until the Purity Check (green screen) appears.

For a 2–piece assembly (see Figure 16):

Loosen the deflection yoke clamp screw and move the deflection yoke back as close to the purity magnet as possible.

Adjust the front rings to set the vertical green raster precisely at the center of the screen (see Figure 18).

NOTES:
1. CRT warm up with white screen (three guns activated) is needed to stabilize the shadow mask expansion.
2. Initial center static convergence (roughly centers three gun beams) is required in order to perform purity adjustment.

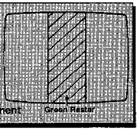


Figure 18. **Green Raster Adjustment**

Slowly move the deflection yoke forward until the best overall green screen is displayed.

For a 1–piece assembly (see Figure 17):

Slowly move the deflection yoke and purity rings assembly toward the CRT board and adjust the purity magnet rings to set vertical green raster at center of screen (see Figure 18).

Gradually move the deflection yoke & purity rings forward and adjust for the best overall green screen.

Continue from here for either assemblies:

Tighten the deflection yoke clamp screw.

Press the **Recall** button on the Remote Control again until the Purity Check (blue screen) and (red screen) appear and observe that good purity is obtained on each respective field.

Press the **Recall** button on the Remote Control again until Purity check (white screen) appears. Observe the screen for uniform white. If purity has not been achieved, repeat the above procedure.

Final Convergence Procedure (see Figure 19 through Figure 21):

Note: *Vertical size and focus adjustments must be completed prior to performing the convergence adjustment. Connect a dot pattern generator to the Receiver. The **Brightness** level should not be higher than necessary to obtain a clear pattern.*

Converge the red and blue dots at the center of the screen by rotating the 4 pole (R with B) Static Convergence Magnets.

Align the converged red/blue dots with the green dots at the center of the screen by rotating the 6 pole (R/B with G) Static Convergence Magnets. Melt wax with soldering iron to reseal the magnets.

Slightly tilt vertically and horizontally (do not rotate) the deflection yoke to obtain a good overall convergence.

If convergence is not reached at the edges, insert permalloy (see following section) from the DY corners to achieve proper convergence. Recheck for purity and readjust if necessary.

After vertical adjustment of the yoke, insert wedge at 11 o'clock position, then make the horizontal tilt adjustment.

Secure the deflection yoke by inserting two side wedges at 3 and 7 o'clock positions.

Apply adhesive between tab (thin portion) of wedge and CRT and place tape over the tab to secure to the CRT.

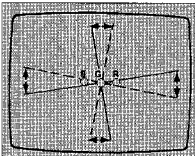
Permalloy Convergence Corrector Strip (Part No. OFMK014ZZ)

This strip is used in some sets to match the yoke and CRT for optimum convergence. If the yoke or CRT is replaced, the strip may not be required.

First converge the set without the strip and observe the corners.

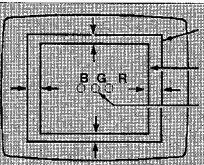
If correction is needed:

1. Place strip between CRT and yoke, in quadrant needing correction. Slowly move it around for desired results.
2. Press adhesive tightly to the CRT and secure with tape.



As the yoke is moved vertically, the rasters produced by the outside guns rotate in opposite directions.

Figure 19. **Vertical Yoke Movement**



Raster produced from one of the outside electron beams

Raster from the other outside electron beam

Static convergence magnets are set for center convergence

As the yoke is moved horizontally, one raster gets larger while the other gets smaller

Figure 20. **Horizontal Yoke Movement**

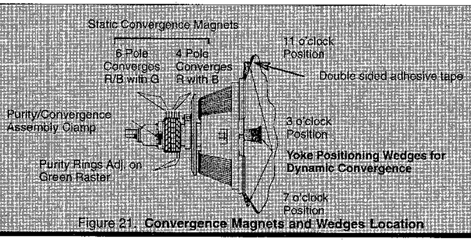

Static Convergence Magnets
6 Pole Converges R/B with G
4 Pole Converges R with B
11 o'clock Position
Double sided adhesive tape
Purity/Convergence Assembly Clamp
3 o'clock Position
Yoke Positioning Wedges for Dynamic Convergence
Purity Rings Adj. on Green Raster
7 o'clock Position

Figure 21. **Convergence Magnets and Wedges Location**

Serviceman Mode (Electronic Controls)

This Receiver has electronic technology using the I²C Bus Concept. It performs as a control function and it replaces many mechanical controls. Instead of adjusting mechanical controls individually, many of the control functions are now performed by using the "On Screen Display Menu". (The **Serviceman Adjustment Mode.**)

Note: *It is suggested that the technician reads all the way through and understand the following procedure for Entering/Exiting the **Serviceman Adjustment Mode**; then proceed with the instructions working with the Receiver. When becoming familiar with the procedure, the Flow Chart for Serviceman Mode may be used as a quick guide.*

Entering Serviceman Mode:

1. While the Receiver is ON and operating in Normal Mode, momentarily short test point FA1 to cold ground (⏚) FA2. (TP pin 8 to pin 3)
   "The Receiver enters the Aging Mode".
   Yellow letters "CHK" appear in the upper left corner of the CRT.
   (The Volume will adjust rapidly.)
2. **Press** the **Action** and the **Volume Up** buttons on the Receiver Control Panel simultaneously.
   "The Receiver enters the Serviceman's Mode".
   The letters in "CHK" turn red.
   (The Volume will adjust normally.)
   (All customer controls are set to a nominal level.)
3. **Press** the **Power** button on the Remote Control to select one of five Serviceman Adjustment Modes.
   a. B = Serviceman VCJ SUB ADJUSTMENTS
   b. C = Serviceman CUTOFF ADJUSTMENTS
   c. S = Serviceman OPTIONS ADJUSTMENTS
   d. M = Serviceman MTS ADJUSTMENTS
   e. "CHK" = Normal operation of CHANNEL ▲ and CHANNEL ▼ and VOLUME ◀ and VOLUME ▶.

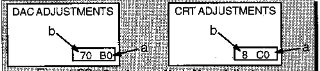


Figure 22. Serviceman Mode Menu Adjustments
An Address Menu appears in the bottom right hand corner of the screen.

For DAC Adjustments:

1.) **Press Channel** ▲ or ▼ on the Remote Control to select one of the 6 available Service Adjustments (a in Figure 22).

Important Note: *Write down the original value set (b in Figure 22) for each address before modifying anything. It is easy to erroneously adjust the wrong item.*

2. **Press Volume** ◀ or ▶ on the Remote Control to adjust the level of the selected Service Adjustment.

B0 = Sub Bright
↓
B1 = Sub Color
↓
B2 = Sub Tint
↓
B3 = Sub Contrast
↓
B4 = Video Adjust.
↓
B5 = Audio Adjust.

Adjustment Range and Default level values for Service Adj.

Service Adjustment	Adj Range	Default Level
Sub Bright (B0)	0 ~ 255	128
Sub Color (B1)	0 ~ 63	33
Sub Tint (B2)	0 ~ 63	33
Sub Contrast (B3)	0 ~ 63	34
Video Adjustment (B4)	0 ~ 15	8
Audio Adjustment (B5)	0 ~ 15	8

Press the **Power** button on the Remote Control to select the Serviceman CRT Adjustment Mode.

For CRT Adjustments:

1. **Press Channel** ▲ or ▼ on the Remote Control to select one of the 6 available Service Adjustments (a in Figure 22).

Important Note: *Write down the original value set (b in Figure 22) for each address adjustment before modifying anything. It is easy to erroneously adjust the wrong item.*

2. **Press Volume** ◀ or ▶ on the Remote Control to adjust the level of the selected Service Adjustment.

C0 = Horiz. Center
↓
C1 = RED Cutoff
↓
C2 = GRN Cutoff
↓
C3 = BLU Cutoff
↓
C4 = RED Drive
↓
C5 = BLU Drive

Adjustment Range and Default level values for Service Adj.

CRT Adjustment	Adj Range	Default Level
Horiz Centering (C0)	0 ~ 15	8
RED Cutoff (C1)	*0 ~ 255	128
GRN Cutoff (C2)	*0 ~ 255	128
BLU Cutoff (C3)	*0 ~ 255	128
RED Drive (C4)	0 ~ 255	128
BLU Drive (C5)	0 ~ 255	128

*Adjustment indicated in 2 steps (0 ~ 255) ➡ (1 ~ 255) (see b in Figure 22)

To Check Purity:

Press the **Recall** button on the Remote Control when in Aging or Serviceman Modes to enter the Purity Field Check Mode.

Note: *The Receiver must be in the Serviceman Mode to display the red, green & blue purity fields.*

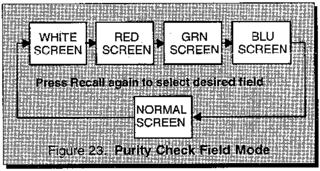


Figure 23. Purity Check Field Mode

Press the **Power** button on the Remote Control to select the Serviceman Options Adjustment Mode.

For Options Adjustments:

1. **Press Channel** ▲ or ▼ on the Remote Control to select one of the 12 available Options Adjustments (a in Figure 22).

Important Note: *Write down the original value set (b in Figure 22) for each address before modifying anything. It is easy to erroneously adjust the wrong item.*

2. **Press Volume** ◀ or ▶ on the Remote Control to adjust the level of the selected Service Adjustment.

S0 = PIP Color
S1 = PIP Tint
S2 = PIP Sync
S3 = Upper 1/9
S4 = Lower 1/9
S5 = Left 1/9
S6 = Right 1/9
S7 = Upper 1/16
S8 = Lower 1/16
S9 = Left 1/16
Sa = Right 1/16
Sb = Clock Adj.

Adjustment Range and Default level values for Service Adj.

Options Adjustment	Adj Range	Default Level
PIP Color (S0)	0 ~ 127	25
PIP Tint (S1)	0 ~ 127	55
PIP Sync (S2)	0 ~ 7	04
Upper 1/9 (S3)	0 ~ 255	229
Lower 1/9 (S4)	0 ~ 255	111
Left 1/9 (S5)	0 ~ 255	27
Right 1/9 (S6)	0 ~ 255	123
Upper 1/16 (S7)	0 ~ 255	229
Lower 1/16 (S8)	0 ~ 255	93
Left 1/16 (S9)	0 ~ 255	27
Right 1/16 (Sa)	0 ~ 255	137
Clock Adj. (Sb)	0 ~ 255	128

Press the **Power** button on the Remote Control to select the Serviceman MTS Adjustment Mode.

For MTS Adjustments:

1. **Press Channel** ▲ or ▼ on the Remote Control to select one of the 5 available MTS Adjustments (a in Figure 22).

Important Note: *Write down the original value set (b Figure 22) for each address before modifying anything. It is easy to erroneously adjust the wrong item.*

2. **Press Volume** ◀ or ▶ on the Remote Control to adjust the level of the selected Service Adjustment.

M0 = Input Level
M1 = Stereo PLLVCO
M2 = Filter
M3 = Low–level Separation
M4 = High–level Separation

Adjustment Range and Default level values for Service Adj.

MTS Adjustment	Adj Range	Default Level
Input Level (M0)	0 ~ 63	31
Stereo PLLVCO (M1)	0 ~ 63	31
Filter (M2)	0 ~ 63	31
Low–level Sep. (M3)	0 ~ 63	31
High–level Sep. (M4)	0 ~ 63	31

IMPORTANT NOTE:
Always Exit the Serviceman Mode following Adjustments.

Exiting the Serviceman Mode:

1. Press the **Action** and the **Power** buttons on the Receiver simultaneously for at least 2 seconds. ***"The Receiver exits Serviceman Mode".***

The Receiver momentarily shuts off; then comes back on tuned to channel 3 with a preset level of sound.

Helpful Hints

Quick Entry To Serviceman Mode:

At times when minor adjustments need to be done to the electronic controls, the method of Entering the Serviceman Mode without removal of the cabinet back is as follows using the Remote Control:

1. Select SET–UP icon and select CABLE mode.
2. Select TIME Icon and set SLEEP timer for 30.
3. Press ACTION button twice to cancel Icon Menus. Tune to Channel 124. Adjust VOLUME to Minimum (0). **On Receiver** press the VOL ◀ button (decrease). Red "CHK" appears in upper corner.

To toggle between Aging and Serviceman modes:

While the "CHK" is displayed on the left top corner of the CRT, pressing the **Action** and the **Volume UP** buttons on the Receiver simultaneously will toggle between the modes.

Instructional Flow Chart for Serviceman Mode

Caution: Always EXIT Serviceman Mode

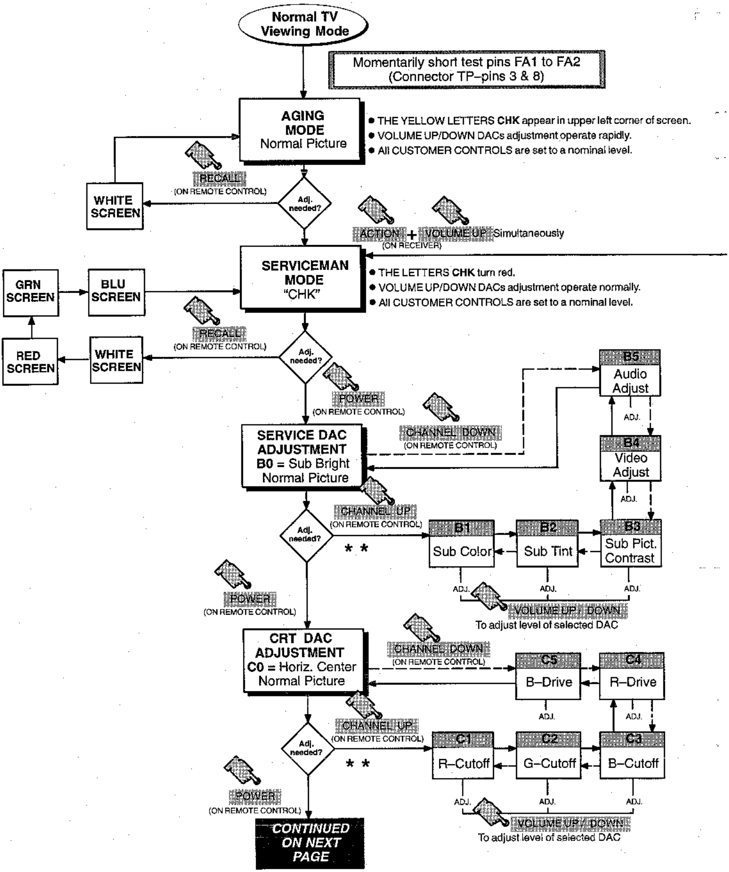

Normal TV Viewing Mode
Momentarily short test pins FA1 to FA2 (Connector TP–pins 3 & 8)
AGING MODE Normal Picture
● THE YELLOW LETTERS CHK appear in upper left corner of screen.
● VOLUME UP/DOWN DACs adjustment operate rapidly.
● All CUSTOMER CONTROLS are set to a nominal level.
RECALL
(ON REMOTE CONTROL)
WHITE SCREEN
Adj. needed?
ACTION + VOLUME UP Simultaneously
(ON RECEIVER)
SERVICEMAN MODE "CHK"
● THE LETTERS CHK turn red.
● VOLUME UP/DOWN DACs adjustment operate normally.
● All CUSTOMER CONTROLS are set to a nominal level.
GRN SCREEN
BLU SCREEN
RED SCREEN
WHITE SCREEN
RECALL
(ON REMOTE CONTROL)
Adj. needed?
POWER
(ON REMOTE CONTROL)
CHANNEL DOWN
(ON REMOTE CONTROL)
SERVICE DAC ADJUSTMENT
B0 = Sub Bright
Normal Picture
B5 Audio Adjust
ADJ.
B4 Video Adjust
ADJ.
CHANNEL UP
(ON REMOTE CONTROL)
Adj. needed?
* *
B1 Sub Color
B2 Sub Tint
B3 Sub Pict. Contrast
ADJ.
ADJ.
ADJ.
VOLUME UP / DOWN
To adjust level of selected DAC
POWER
(ON REMOTE CONTROL)
CRT DAC ADJUSTMENT
C0 = Horiz. Center
Normal Picture
CHANNEL DOWN
(ON REMOTE CONTROL)
C5 B–Drive
C4 R–Drive
ADJ.
ADJ.
CHANNEL UP
(ON REMOTE CONTROL)
Adj. needed?
* *
C1 R–Cutoff
C2 G–Cutoff
C3 B–Cutoff
ADJ.
ADJ.
ADJ.
VOLUME UP / DOWN
To adjust level of selected DAC
POWER
(ON REMOTE CONTROL)
CONTINUED ON NEXT PAGE

Figure 24. **Flow Chart for Serviceman Mode**

Instructional Flow Chart for Serviceman Mode – Continued

*** * *Important Note***

Before making any DAC adjustments note the existing values!

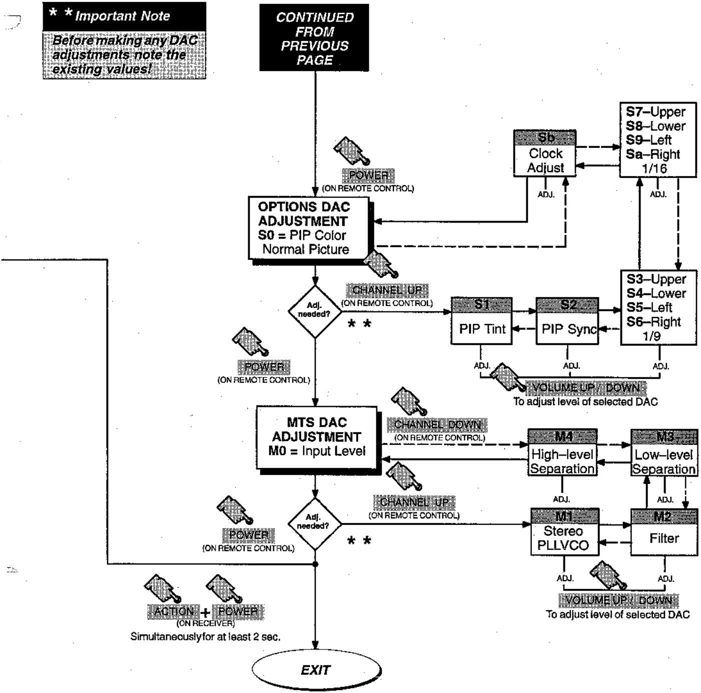

CONTINUED FROM PREVIOUS PAGE
POWER
(ON REMOTE CONTROL)
OPTIONS DAC ADJUSTMENT
S0 = PIP Color Normal Picture
Sb
Clock Adjust
S7–Upper
S8–Lower
S9–Left
Sa–Right
1/16
ADJ.
ADJ.
CHANNEL UP
(ON REMOTE CONTROL)
Adj. needed?
* *
S1
PIP Tint
S2
PIP Sync
S3–Upper
S4–Lower
S5–Left
S6–Right
1/9
ADJ.
ADJ.
ADJ.
VOLUME UP / DOWN
To adjust level of selected DAC
POWER
(ON REMOTE CONTROL)
MTS DAC ADJUSTMENT
M0 = Input Level
CHANNEL DOWN
(ON REMOTE CONTROL)
M4
High–level Separation
M3
Low–level Separation
ADJ.
ADJ.
CHANNEL UP
(ON REMOTE CONTROL)
Adj. needed?
* *
M1
Stereo PLLVCO
M2
Filter
ADJ.
ADJ.
VOLUME UP / DOWN
To adjust level of selected DAC
POWER
(ON REMOTE CONTROL)
ACTION + POWER
(ON RECEIVER)
Simultaneouslyfor at least 2 sec.
EXIT

Figure 25. **Flow Chart for Serviceman Mode (Continued)**

Note: When *EXITING*, the Receiver shuts off, then turns on, TUNED TO CHANNEL 3 WITH A PRESET SOUND LEVEL.

Any Programmed Channels, Channels Caption data and some other user defined settings will be erased.

Service Adjustments (Electronic Controls)

Sub–Brightness

Serviceman DAC Adjustment (B0)

Adjustment of this control is important for setting proper operation of customer brightness and picture controls. This adjustment must be made after Sub–Contrast or Color Temperature adjustments are made. **Do not adjust** SCREEN after the Sub–Brightness is set.

Preparation:

Apply a color bar signal with 100 IRE white and 7.5 IRE black. (Switch Color to "OFF" on the signal generator.) Operate the Receiver for a minimum of 10 minutes prior to performing this adjustment.

Procedure:

In the Serviceman Mode for making electronic adjustments, select the DAC adjustment (B0) and adjust until the black bar starts to look grey. Then decrease the level to the point where grey turns to black.

Video Adjustment Level

Serviceman DAC Adjustment (B4)

Preparation:

1. Obtain an NTSC color bar pattern with 100 IRE white and 87.5% modulation.
2. Connect the oscilloscope to TP12. Use cold ground for scope connection. Set the scope at Horizontal Sweep rate (20µs) time base.

Procedure:

1. In the Serviceman Mode for making electronic adjustments, select DAC Video Adjustment Level (B4) and adjust for 1V from sync tip to white level. See Figure 26.

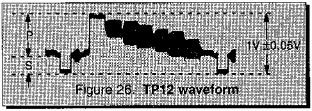


Figure 26. **TP12 waveform**

2. Check that the sync signal amplitude (ratio between the sync signal to detection output) is within the range of 30 ±5% (S/(S+P) = 30 ±5%).
3. Set the DAC Sub–Contrast Adjustment (B3).

Sub–Contrast

Serviceman DAC Adjustment (B3)

This adjustment is factory set. **Do not adjust** unless repairs are made to associated circuit, the CRT Board or when the CRT is replaced.

Preparation:

1. Apply a color bar signal pattern with 87.5% modulation, 70% saturated color bar with a 100 IRE white and 7.5 black.

Note: *The pattern used in this procedure is an EIA color bar pattern with 87.5% modulation with 100 IRE white and 7.5 black. Correlate the information in this procedure to the pattern used if another signal is used.*

2. Connect the oscilloscope to TP47G on the A–Board. Set the scope time base to 20µs (horizontal).
3. Connect a jumper from TPD2 to ground (⏚).

Procedure:

1. In the Serviceman Mode for electronic adjustments, select DAC Sub–Contrast Adjustment (B3) and adjust for 2.9Vp–p ±0.1V from white level to black level on video waveform (see video waveforms detail, Figure 27).

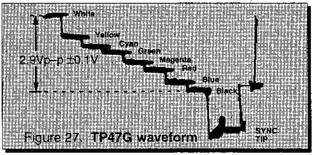


Figure 27. **TP47G waveform**

2. Remove the jumper (Preparation steps 3).

Tint/Color Adjustment

Serviceman DAC Adjustment (B2) (B1)

Preparation:

1. Apply a rainbow color bar signal.
2. Connect the oscilloscope to TP47B (A–Board).
3. Connect a jumper from TPD2 to GND (⏚).

Procedure:

1. In the Serviceman Mode for making electronic adjustments, select DAC Sub–Tint Adjustment (B2). Adjust until the waveform measured is as the one shown in Figure 28.

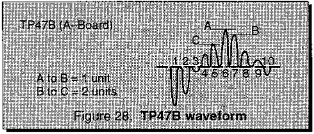


Figure 28. **TP47B waveform**

2. Connect the oscilloscope to TP47G (A–Board).
3. Select DAC Sub–Color Adjustment (B1) and adjust for peak to peak amplitude to be 0.75Vp–p ±0.05V for 32" and 0.80Vp–p ±0.05V for 35" Receivers, as shown in Figure 29.

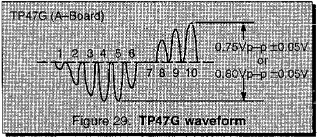


Figure 29. **TP47G waveform**

4. Remove the jumper (Preparation step 3).

Color Temperature Adjustment (B/W Tracking)

Serviceman DAC Adjust. (C1) (C2) (C3) (C4) (C5)

Minor Touch–Up Method

OBSERVE low and high brightness areas of a B/W picture for proper tracking. Adjust only as required for "good grey scale and warm highlights".

1. LOW LIGHT areas – In Serviceman Mode for making electronic adjustments, select Cutoff (C1) RED, (C2) GRN, (C3) BLU and adjust the picture for grey.
2. HIGH LIGHT areas – In Serviceman Mode for making electronic adjustments, select Drive (C4) RED, (C5) BLU and adjust the picture for warm whites.

Complete Adjustment

Preparation:

1. Turn the Receiver "ON" and allow 10 minutes warm up at high brightness.
2. Apply a color bar signal with color "OFF".
3. Turn the SCREEN control (part of FBT T551) fully counterclockwise.

Procedure:

Preset Serviceman DACs C1, C2 and C3 levels to 128 for best results.

1. Connect the oscilloscope to TP35 (CRT–Board).
2. In Serviceman Mode for making electronic adjustment, select the Sub–Bright DAC (B0).
3. Connect a jumper from TPS8 to FA2, (connector TP pin 6 to pin 3).
4. Observe the oscilloscope waveform at Horizontal rate and adjust the Serviceman Mode Sub–Bright DAC (B0) level until a scanning period of 2.4V above DC ground is measured, as indicated in Figure 30.

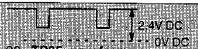


Figure 30. **TP35 waveform**

5. Remove the jumper. (Step 3)
6. Connect the scope to GRN Cathode (KG) on the CRT–Board.
7. In the Serviceman Mode for making electronic adjustments, select the GREEN CUTOFF DAC (C2).
8. Connect a jumper from TPS8 to FA2, (connector TP pin 6 to pin 3).
9. View scope trace at Horizontal rate and adjust the Serviceman Mode DAC (C2) level until a scanning period of 195V above DC ground is measured, as indicated in Figure 31.

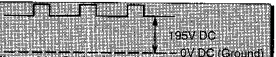


Figure 31. **Cathode waveform, Adjustment Waveform Detail (Steps 9, 14 & 19)**

10. Remove the jumper. (Step 8)
11. Connect the scope to the RED Cathode (KR).
12. In Serviceman Mode for making electronic adjustments, select the RED CUTOFF DAC (C1).
13. Connect a jumper from TPS8 to FA2, (connector TP pin 6 to pin 3).
14. View the scope trace and adjust the Serviceman Mode DAC (C1) for the scanning period to be 195V above DC ground. (See Figure 31)
15. Remove the jumper. (Step 13)
16. Connect the scope to the BLU Cathode (KB).
17. In Serviceman Mode for making electronic adjustments, select the BLU CUTOFF (C3).
18. Connect a jumper from TPS8 to FA2, (connector TP pin 6 to pin 3).
19. View the scope trace and adjust the Serviceman Mode DAC (C3) for the scanning period to be 195V above DC ground. (See Figure 31)
20. Turn the Screen Control (part of FBT) slowly clockwise until a color horizontal line appears.
21. With the other two colors Serviceman Mode DAC CUTOFF adjustments (C1) RED, (C3) BLU; increase the colors to create a white horizontal line.
22. Remove the jumper. (Step 18)
23. Confirm that a good gray scale is established by viewing B/W color bar pattern.
24. In the Serviceman Mode for making electronic adjustments select the DAC DRIVE adjustments (C4) RED, (C5) BLU and adjust for warm white in a white color bar pattern.
25. EXIT the Serviceman Mode.
26. Adjust the Picture Menu Video Adjustments **Bright** and **Picture** from low scale to high scale and check Black and White tracking.
27. If correction is needed: Re–Enter the Serviceman Mode and perform the **Minor Touch – Up Method.**
28. Perform **Sub–Brightness** Adjustment procedure.

Horizontal Centering

Serviceman DAC Adjustment (C0)

Preparation:

Connect a crosshatch generator.

Procedure:

1. In the Serviceman Mode for making electronic adjustments. Select the Horizontal Centering Adjustment DAC (C0) and adjust until the center of the crosshatch pattern is centered on CRT.
2. EXIT the Serviceman Adjustment Mode.

Audio Adjustment

Serviceman DAC Adjustment (B5)

This adjustment is factory set and needs to be performed only when IC002 or IC101 is replaced.

Preparation:

1. Apply the following signal at the antenna (70dB ±5dB, 75Ω open P/S 10dB): audio signal set to monaural, 300Hz. 100% modulation; video input of 100IRE flat field, 30% modulation.
2. Connect the RMS Meter with filter jig as shown in Figure 32.

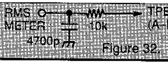


Figure 32. **Filter Jig**

Procedure:

1. In the Serviceman Mode for making electronic adjustments, select the Audio Adjustment DAC (B5) and adjust until 150mV RMS ±7.5mV RMS is measured.
2. EXIT the Serviceman Adjustment Mode.

MTS Circuit Adjustments

The MTS Circuit Adjustments require four steps:

1. Stereo VCO Adjustment.
2. Filter Adjustment.
3. Input Level Adjustment.
4. Stereo Separation Adjustment.

Stereo VCO Adjustment (M1)

Preparation:

1. Connect a 1kΩ resistor between TP14 and ground.
2. Connect a 22µF, 16V capacitor between TPA10 and ground.
3. Connect a frequency counter to TPE11.

Note: *15 seconds aging is required prior to performing the following procedure.*

Procedure:

Adjust the MTS Stereo PLL VCO (M1) until the frequency counter measures 15.534kHz ±50Hz.

Filter Adjustment (M2)

Preparation:

1. Connect a 1kΩ resistor between TP14 and ground.
2. Connect a 22µF, 16V capacitor between TPA10 and ground.
3. Short TPS8 to ground.
4. Connect a signal generator (sine wave) to TPE1.
5. Connect a scope to TPE10.

Procedure:

1. Apply the following signal from the signal generator: 15.734kHz, 100mV rms, sine wave.
2. Adjust the MTS Filter Adjustment (M2) until the amplitude displayed on the scope is minimum.

Input Level Adjustment (M0)

Preparation:

1. Connect an RMS meter with filter jig as shown in Figure 33.

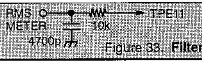


Figure 33. **Filter Jig**

2. Connect an RF signal generator to the RF antenna input.

Procedure:

1. Apply the following signal from the RF signal generator:
   Video: 100 IRE flat field, 30% modulation.
   Audio: 300Hz, 100% modulation, monaural
   (70 ±5dB, 75Ω OPEN, P/S 10dB).
2. Adjust the MTS Input Level Adjustment (M0) until the voltage measured is 212 ±10.5mV rms.

Stereo Separation Adjustments (M3 & M4)

Preparation:

1. Connect an RF signal generator to the RF antenna input.
2. Connect a scope to TPE11.

Procedure:

1. Apply the following signal from the RF signal generator:
   Video: 100 IRE flat field, 30% modulation.
   Audio: 300Hz, 30% modulation, stereo (left only)
   (70 ±5dB, 75Ω OPEN, P/S 10dB).
2. Adjust the MTS Low–Level Separation Adjustment (M3) until the amplitude displayed on the scope is minimum.
3. Apply the following signal from the RF signal generator:
   Video: 100 IRE flat field, 30% modulation.
   Audio: 3kHz, 30% modulation, stereo (left only)
   (70 ±5dB, 75Ω OPEN, P/S 10dB).
4. Adjust the MTS High–Level Separation Adjustment (M4) until the amplitude displayed on the scope is minimum.
5. Repeat above steps 2 through 4 until the amplitude is at minimum for both signals.

Clock Adjustment (Sb)

Preparation:

Connect the frequency counter from TPS1 (IC001 Pin 13) to cold ground (⏚).

Note: *Frequency Counter probe capacitance should be 8pF or less.*

Procedure:

1. Turn the Receiver "OFF" with the AC power applied.
2. Measure TPS1 (IC001 pin 13) for the frequency of the waveform and record the reading.

   Note: *Pin 13 measurement must have at least four digits of resolution following the decimal point Example: 000.0000*
3. Turn the Receiver back "ON".
4. Place the Receiver into Serviceman Mode for making electronic adjustment, select the Clock Adjustment DAC (Sb).
5. Calculate and set Sb based on the following formula:

$$Sb = 128 + 0.901 \times 10^6 \times \frac{\{244.1406 - \text{pin 13 [Hz]}\}}{244.1406}$$

Note: *Pin 13 measurement will not change regardless of the value stored in Sb.*

Service Adjustments (Mechanical Controls)

Note: *To locate the referenced components on schematics check the vicinity of the component indicated in the parentheses.*

RF AGC Delay R106 (IC101 pin 29)

Adjust only if overloading on strong signal or if busy background (snow) is present on moderate strength signals.

1. Adjust the RF AGC control, R106, until snow appears, then adjust the control until snow is eliminated.
2. Check all channels for optimum setting.

AFT Field Adjustment L151 (IC101 pin 32)

1. Select TV signal mode from the Menu.
2. Defeat AFT by applying a jumper from TPS7 (R066) to ground (⏚).
3. Connect a DVM to the AFT test point, TP16.
4. Use the Remote Control to check all the active High Band channels 7~13 for AFT voltage range. Select a channel where the AFT voltage measured is in approximate center of the voltage range.
5. Adjust L151 for 4.6V ±0.1V at TP16.
6. Check all the active channels for proper AFT correction. Touch up L151 if required. Remove the jumper installed in step 2.

Note: *Do not use the TV/CABLE channel with offset carriers for adjustment or in determination of the low and high range of the AFT voltage.*

Audio Alignment L201 (IC101 pin 25)

1. Select an active TV channel.
2. Attenuate the signal (loosely couple antenna lead or use RF attenuator pad) for noisy sound.
   Adjust L201 for maximum sound. Signal to noise ratio is best when L201 is peaked.
3. Connect an antenna or remove the RF attenuator for strong signal.

VCO Field Alignment L105 (IC101 pins 36 & 37)

1. Connect a balance antenna and select a midband channel (Ch 10, 11 or 12)
2. Attenuate the signal strength for a weak noisy video.
3. While observing the picture tube, adjust L105 until best picture appears.
4. Change channels and observe that they are tuning properly.
5. If the channel monitored is not clear, repeat steps 1, 3 and 4 while applying a stronger signal.

Comb Filter Adjustment R3215 & L3202

(Q3202 on X–Board)

1. Connect a Signal Generator to the Video–In jack and apply a RED flat field color.
   Note: *Video input level is approximately $2V_{p-p}$.*
2. Connect a scope between A3 pin 5 (or TP47G or TP35) and ground.
3. While observing the scope adjust R3215 until chroma level is minimized.
4. While observing the scope adjust L3202 until chroma level is minimized.
5. Repeat above steps 3 and 4 two or three more times making sure that the chroma level is kept to minimum.

Vertical Size R453 (IC451 pin 3)

1. Turn the VERTICAL SIZE control, R453, CCW until the top and the bottom edges of the raster are visible.
2. Adjust the VERTICAL SIZE control CW until the top and the bottom of the raster touch the bezel edge. Advance SIZE control CW an additional 30 degrees. This will be approximately 10% overscan. Linearity adjustment is done automatically when the size is being adjusted. (Best results can be obtained with a round test pattern.)

Pincushion Correct (R761) & Horizontal Width (R760) Z–Board

Preparation

1. Connect crosshatch pattern generator.
2. Normalize the PICTURE Menu Video Adjustments.
3. Adjust Horizontal Width (R760) to MID position.

Procedure

1. Adjust Pincushion Correct Control (R761) for the straightest left and right vertical lines.

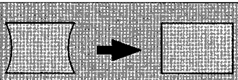


Figure 34. Pincushion Adjustment

2. If needed, adjust Horizontal Width (R760). Adjust for equal horizontal size of right side and left side boxes.

Focus (Part of T551)

Preparation:

Connect a Signal generator and select a dot pattern.

Procedure:

Adjust the FOCUS control to obtain the sharpest and clearest dot pattern.

a. adjust for best center.
b. adjust for best area between the center and top right corner.

AIS (Artificial Intelligence Sound)

This receiver uses Artificial Intelligence (AI) Sound to modulate abrupt changes in the sound volume level. It is primarily designed to prevent sudden loud changes in sound volume, such as those which occur when a television program is interrupted by a commercial. It also equalizes the maximum volume level when switching between different channels or when switching between broadcast and other A/V sources.

The AIS circuit is incorporated into the system through the use of an Automatic Gain Circuit, IC2451, which is located on the A–Board. AIS activation is MPU controlled through the IC's switch terminal at pin 7. Right and left channel sound enters the circuit at pins 1 and 10 respectively, where they are sampled, then either amplified or dampened according to preset levels. The "streamlined" sound is then fed through pins 3 and 8 (left and right channels respectively).

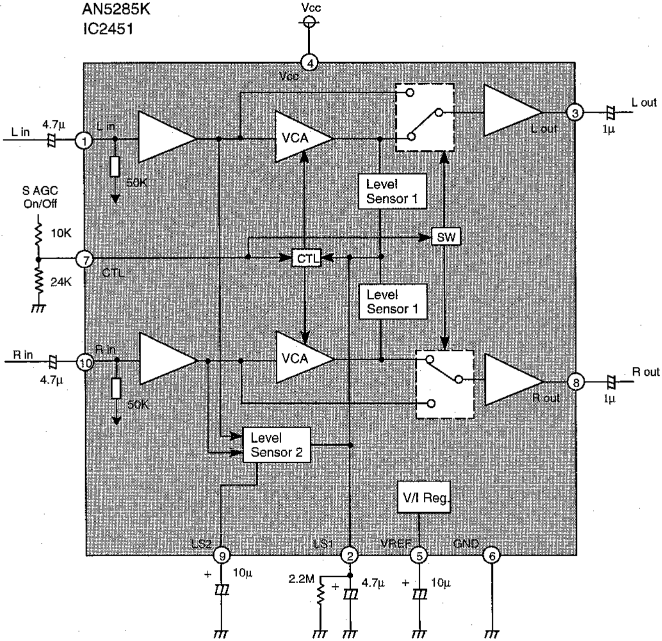

AN5285K
IC2451
Vcc
4
Vcc
L in
4.7µ
1
L in
VCA
L out
3
L out
1µ
50K
Level Sensor 1
S AGC On/Off
10K
SW
7
CTL
CTL
24K
Level Sensor 1
R in
10
R in
4.7µ
VCA
R out
8
R out
1µ
50K
Level Sensor 2
V/I Reg.
LS2
LS1
VREF
GND
9
2
5
6
10µ
2.2M
4.7µ
10µ

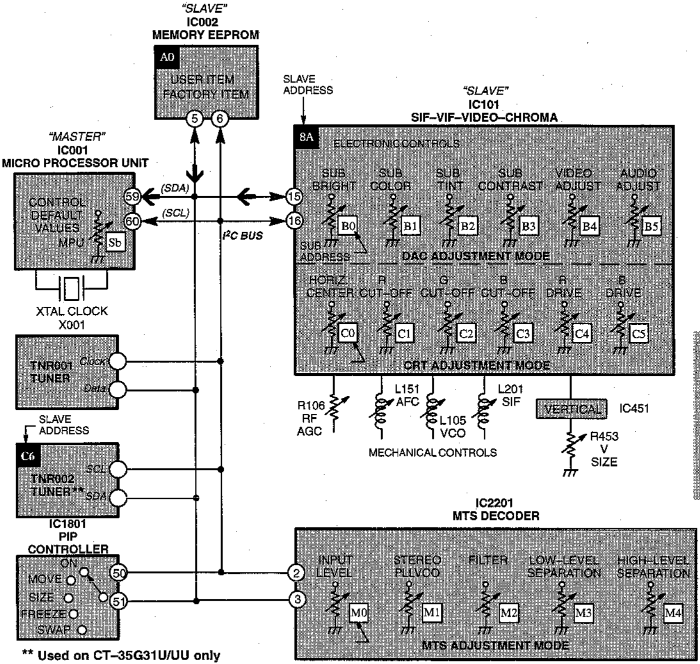
Figure 35. **IC2451 – Automatic Gain Circuit**

I^2C Bus Line System

This Receiver makes use of one of the latest electronic technologies by using an I^2C (Inter–Integrated Circuit) Bus Line Concept. Two wires, SDA (Serial Data) and SCL (Serial Clock) carry information between devices connected to the Bus. Each device connected to the Bus has a unique address for receiving data information (a Receiver) from a source (the Transmitter).

The devices are also considered to be a "Master" or a "Slave" when data is transmitted or received. In this Receiver, the "Master" (Micro Processor Unit, IC001) is the device which initiates a data transfer in the Bus line and generates the clock signal required to permit the data to be sent. The "Slaves" (MEMORY I^2C EEPROM, IC002 and VIF–SIF–VIDEO–CHROMA JUNGLE, IC101) are the devices addressed by the MPU and receive the data transmitted.

This system usually performs as a control function and replaces many of the required mechanical controls needed in a television receiver. Instead of adjusting various mechanical controls individually, many of the control functions can be performed electronically using "On Screen Menus" (the Serviceman Mode).


"SLAVE"
IC002
MEMORY EEPROM
A0
USER ITEM
FACTORY ITEM
5
6
SLAVE
ADDRESS
"SLAVE"
IC101
SIF–VIF–VIDEO–CHROMA
8A
ELECTRONIC CONTROLS
SUB BRIGHT
SUB COLOR
SUB TINT
SUB CONTRAST
VIDEO ADJUST
AUDIO ADJUST
B0
B1
B2
B3
B4
B5
SUB ADDRESS
DAC ADJUSTMENT MODE
HORIZ. CENTER
R CUT–OFF
G CUT–OFF
B CUT–OFF
R DRIVE
B DRIVE
C0
C1
C2
C3
C4
C5
CRT ADJUSTMENT MODE
15
16
"MASTER"
IC001
MICRO PROCESSOR UNIT
CONTROL DEFAULT VALUES
MPU
Sb
59
60
(SDA)
(SCL)
I²C BUS
XTAL CLOCK
X001
TNR001 TUNER
Clock
Data
SLAVE
ADDRESS
C6
TNR002 TUNER**
SCL
SDA
IC1801
PIP
CONTROLLER
ON
MOVE
SIZE
FREEZE
SWAP
50
51
R106
RF
AGC
L151
AFC
L105
VCO
L201
SIF
MECHANICAL CONTROLS
VERTICAL
IC451
R453
V
SIZE
IC2201
MTS DECODER
INPUT LEVEL
STEREO PLLVCO
FILTER
LOW–LEVEL SEPARATION
HIGH–LEVEL SEPARATION
2
3
M0
M1
M2
M3
M4
MTS ADJUSTMENT MODE

**** Used on CT–35G31U/UU only**

Figure 36. **I^2C Bus**

Switching Power Supply

B+ source voltages are produced at the secondary of T801 by high frequency switching of a MOSFET transistor inside IC801. Also included in the STK730–020 package is an Amplifier, Error Detector and Over Current Protection circuit. Altogether, these circuits produce a semi regulated off line power supply circuit which require few external parts.

Operation

The switching action is done in the following way:

Starter voltage from the bridge rectifier is applied to IC801 pin 4 (the Gate of MOSFET, TR1) through resistors R814 and R817. TR1 turns ON and Drain current starts to flow through the primary winding (NP) of T801. At the same time a voltage is induced at the ND1 winding which keeps a voltage on the Gate and TR1 stays ON. Drain current continues to flow and increases the voltage across the current detecting resistor R805 (IC801 pin 8). This induced voltage is integrated by the R/C time constant of IC801 internal resistor R3 and external capacitor C828 (pin 7). The voltage is applied to the Base of IC801 internal transistor TR3.

Regulation

The primary winding of T801 (NP) and the secondary windings (NS) are wired with opposite polarity. When TR1 is conducting. The current flows through winding NP. The secondary windings (NS) have no current because the B+ rectifier diodes block the flow.

The current flowing through TR1 and NP winding increases at a linear rate. When the voltage between Pins 1 and 3 of IC801 reach a fixed voltage of approximately 40.5V, TR1 turns OFF by the operation of IC801 internal error amp. This provides a state of regulation.

The secondary windings NS are wired so their voltages are in proportion to the voltage across the ND2 winding. Therefore output voltage is controlled by the error amp monitoring the voltage across ND2 winding and controls the conduction of TR1.

When TR1 turns OFF, the energy stored in T801 primary winding (NP) collapses and induces an opposite polarity voltage across the secondary windings (NS). B+ Rectifier diodes now conduct and allow current flow. When the total energy has collapsed at the primary winding, the ND2 winding also has a low voltage. The voltage across IC801 Pins 1 and 3 is now less than 40.5V and the internal error amp turns OFF to allow TR1 to conduct again. Reverse voltage polarity is again induced across the primary winding. This series of events repeats and the voltages of the secondary windings increase. When TR1 turns OFF, the energy is transferred to the secondary windings and TR1 is turned back on by the backswing. A stable oscillation begins.

Over Current/Voltage Protection

The over current/voltage protection circuit consist of IC801 internal components R3, TR3 and external components R805 (Pins 8, 9), R807, D807 (Pin7). Capacitor C828 (Pin 7) filters the base bias voltage of internal transistor TR3.

When output power increases because of a defect in a B+ source and excessive current flows, the Source current of TR1 increases. The voltage drop across R805 increases to cause oscillation frequency to decrease. Thus output voltage lowers. In other words, when the voltage drop across R805 increases, the base bias for TR3 also increases. When the bias reaches 0.6V, TR3 conducts and loads down the TR1 Gate bias to turn TR1 OFF. At the same time, the ND1 winding's current flows through R807 and D807 to produce a negative voltage and prevents TR1 from turning ON, as an over voltage protection.

The Source current of TR1 is a triangular wave shape. When output current increase, the on time of TR1 stays constant but the off time becomes longer. As a result, frequency decreases and the output power decreases for over current/voltage protection.

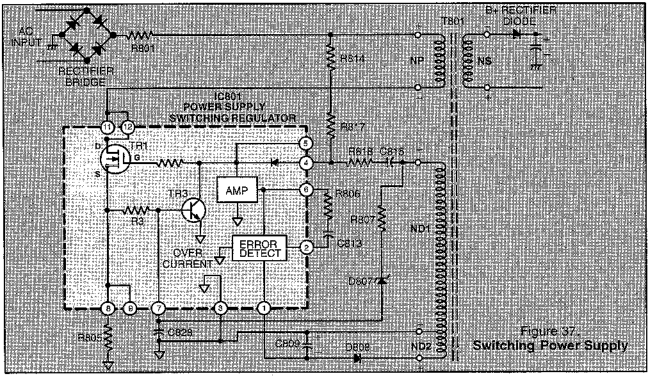


Figure 37.
Switching Power Supply

Power Supply Protection

A power protection scheme is used in the NA5D chassis family. MPU (IC001) Pin 6 is a dual function Pin. The ACTION button function is activated when Pin 6 voltage is 0.44V or less. An Over Voltage Protect function is activated when Pin 6 voltage is 3.9V or higher.

With the Receiver on, the power supply B+ 16.5V is monitored and voltage divided by R047/R048. As long as the voltage at IC001 Pin 6 is 0.4V ~ 3.9V (depending on power supply operation) the Receiver operates normally.

If a major power supply switching IC failure occurs, the power supply may far exceed the normal +16.5V ±2V specification. IC001 Pin 6 voltage will increase above 3.9V and internal circuitry of the IC will cause Pin 31 (power) to go low. When this happens, the base of Q003 is held low and it can not conduct. Relay RL001 deenergizes to open the on contact in the relay and shuts the Receiver off. This condition will remain until AC power is momentarily disconnected.

If when pressing the power button after AC is applied again and the Receiver comes on but goes off after a few seconds, there is a problem in the Receiver's power supply.

WARNING: Because Pin 6 is a dual function Pin, do not press the "ACTION" button on the Receiver. Pressing the button when the above symptom appears will inhibit the Overvoltage Protection and if the Receiver is powered on again, severe damage may happen to the entire chassis. If IC801 is changed to correct a power supply failure, also check or change D806, D807and D808 before reapplying power to the chassis. During a major failure, these components can fail, causing the I.C. to appear to operate normally, but it may run very hot, leading to another I.C. failure very quickly.

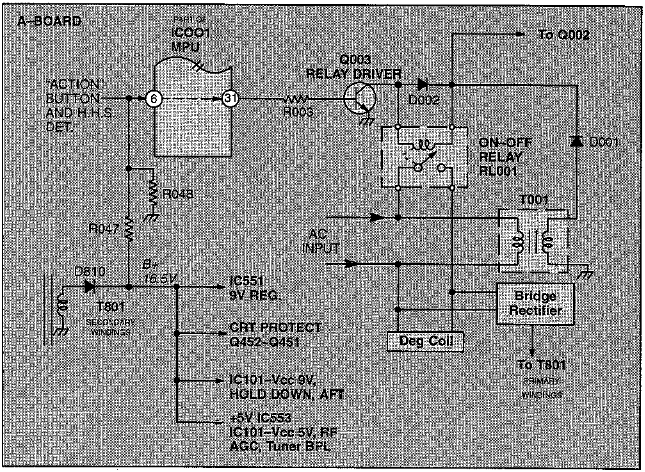

A-BOARD
PART OF
IC001
MPU
"ACTION"
BUTTON
AND H.H.S.
DET.
6
31
Q003
RELAY DRIVER
R003
D002
To Q002
ON-OFF
RELAY
RL001
D001
T001
R048
R047
AC
INPUT
D810
B+
16.5V
T801
SECONDARY
WINDINGS
IC551
9V REG.
CRT PROTECT
Q452~Q451
IC101-Vcc 9V,
HOLD DOWN, AFT
+5V IC553
IC101-Vcc 5V, RF
AGC, Tuner BPL
Bridge
Rectifier
Deg Coil
To T801
PRIMARY
WINDINGS

Figure 38.
Power Supply Protection

CRT Protection Circuit

The CRT Protection Circuit is made up of transistors Q452 and Q451. The circuit blanks the CRT in the event of vertical sweep loss.

During normal operation, Q452 monitors vertical sweep by being connected to the low side of the vertical yoke. When Q452 is off, C458 starts to charge from the 16V source through resistors R464 and R471. The RC time constant is such that the charging is slow. When Q452 is conducting, C458 discharges through R471 and the transistor to ground. The RC time constant is such that the discharge is fast. The slow charging and fast discharging along with voltage divider R470/R460 prevents sufficient bias for transistor Q451 to conduct. With Q451 not conducting, Pin 1 of IC101 is high and the ABL functions normally.

If yoke current ceases (due to an open yoke or no voltage at IC451 Pin 11), there is no base bias for transistor Q452. The transistor is now non conductive. Capacitor C458 is now allowed to charge a longer time to supply enough bias through the voltage divider R470/R460 for Q451 to conduct. When it does, the voltage at Pin 1 of IC101 goes low and cuts off the CRT beam current.

Diode D452 is added to the collector of Q452 to prevent the circuit from operation when Pin 3 of IC101 is grounded for the Service Switch function when setting the CRT cutoff.

It is important for the CRT life that this circuit be checked before returning a repaired Receiver to a customer. A quick test is to short Q452 base to ground. The CRT should blank. If not, troubleshoot the circuit for cause.

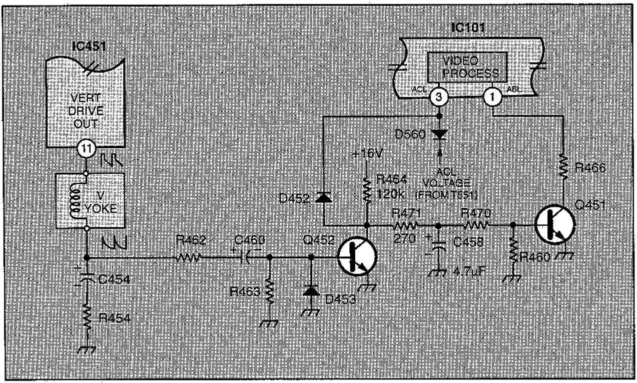

IC101
VIDEO PROCESS
ACL
3
1
ABL
IC451
VERT DRIVE OUT
11
V YOKE
D560
+16V
R464
120K
ACL VOLTAGE (FROM T551)
R466
Q451
D452
R471
270
R470
C458
4.7uF
R460
R462
C460
Q452
C454
R463
D453
R454

Figure 39. **CRT Protect Circuit**

Horizontal Hold Down Circuit

This circuit protects against excessive high voltage and CRT beam current. If for any reason the high voltage and/or CRT beam current exceeds a predetermined level, the Hold Down Circuit operates to increase the horizontal frequency. If the level increases further, the Hold Down Circuit will blank the CRT.

The CRT heater voltage from pin 6 of the flyback transformer (FBT) T551 is rectified by diode D531. This voltage is directly proportional to the high voltage variations. The voltage is filtered and divided by the precision resistors R532/R533 to approximately 2.4V and applied to Pin 49 (Hold Down) of IC101. With this voltage as the normal condition, the Hold Down Circuit is inactive and has no effect on the horizontal frequency or blanking the CRT.

The Hold Down Circuit inside IC101 is a (NPN) differential amp. One base of the differential amp is connected to Pin 49 (approximately 2.4V). The other base is connected to Pin 51 through an internal voltage divided of equal resistance. Pin 51 is clamped at a 6V DC reference voltage by the zener diode, D532. The voltage at the base of the differential amp is 3V. (1/2 of the reference voltage, 6V)

Basically, the Hold Down Circuit compares the voltage at Pin 49 (approximately 2.4V) to half of Pin 51 (clamped 6V). If the CRT heater pulse amplitude from T551 (representative of high voltage) increases, the positive voltage at the cathode of D531 and at Pin 49 of IC101 also increases.

When the increased DC voltage at Pin 49 exceeds half of Pin 51 reference voltage by a predetermined amount, the Hold Down Circuit (differential amp.) changes conduction state and shifts the horizontal count down for a higher sweep frequency (out of sync condition) to prevent unsafe operation. For further safety, when Pin 49 voltage is extremely excessive, another internal differential amp changes state to blank the CRT.

An increase in the CRT beam current produces more negative ABL voltage at Pin 3 of T551 (FBT) which is coupled to Pin 51 of IC101 via resistor R534. This increased negative voltage opposes the positive voltage at Pin 51 and lowers the DC reference voltage to less than 6V. This in turn causes the Hold Down Circuit to operate sooner when Pin 49 voltage increases.

Thus, excessive levels of high voltage and/or increased CRT beam current cause determining of the horizontal oscillator frequency and eventual blanking of the CRT to assure operation within safe limits.

The B+ circuit and the Hold Down Circuit are not adjustable. If components in the designated areas of the schematic for critical parts are changed, operation of the Hold Down Circuit must be checked to insure that high voltage and CRT beam current does not exceed safe operation parameters. Check the following for possible failure:

1. Measure the DC voltage at Pin 49 of IC101 (reading should be close to +2.4V). If not, check D531, R531, C531, R532, R533 and IC101.
2. Measure the DC voltage at Pin 51 of IC101 (reading should be +6V.) If not, check R534, C532, R539, D532, R538 and IC101.

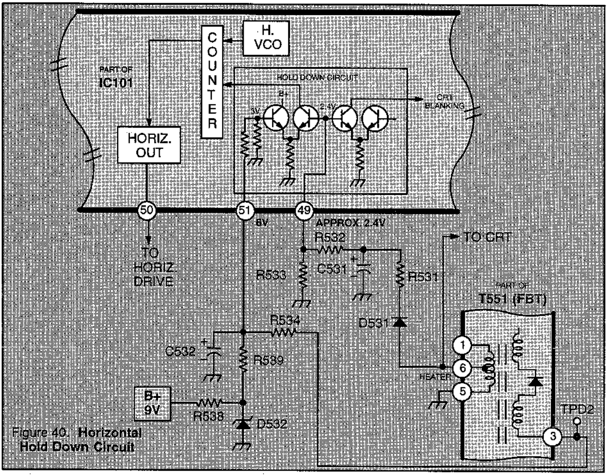


Figure 40. Horizontal Hold Down Circuit

Audio Signal Path Block Diagram
CT-35G31U/UU

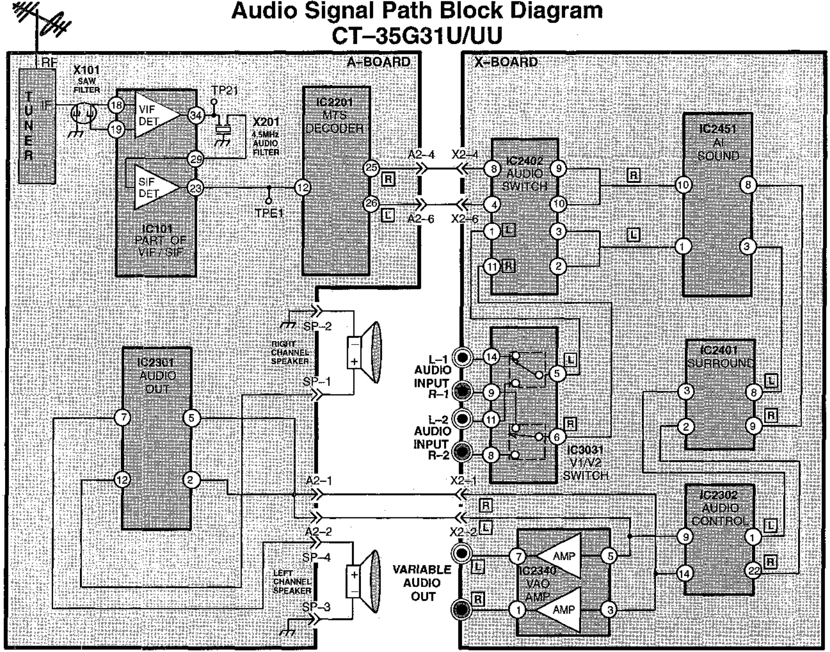

A-BOARD
X-BOARD
RF
TUNER
IF
X101
SAW FILTER
18
19
VIF DET
34
TP21
X201
4.5MHz AUDIO FILTER
29
SIF DET
23
IC101
PART OF VIF / SIF
TPE1
12
IC2201
MTS DECODER
25
26
R
L
A2-4
X2-4
A2-6
X2-6
IC2402
AUDIO SWITCH
8
4
1
11
9
10
3
2
IC2451
AI SOUND
10
1
8
3
SP-2
RIGHT CHANNEL SPEAKER
SP-1
IC2301
AUDIO OUT
7
5
12
2
L-1
AUDIO INPUT
R-1
L-2
AUDIO INPUT
R-2
14
9
11
8
5
6
IC3031
V1/V2
SWITCH
IC2401
SURROUND
3
2
8
9
A2-1
X2-1
A2-2
X2-2
SP-4
LEFT CHANNEL SPEAKER
SP-3
VARIABLE AUDIO OUT
AMP
IC2340
VAO AMP
7
1
5
3
IC2302
AUDIO CONTROL
9
14
1
22

Figure 41. **Audio Signal Path Block Diagram**

Audio Signal Path Block Diagram
CT–32S20U & CT–35G21U/UU/CU

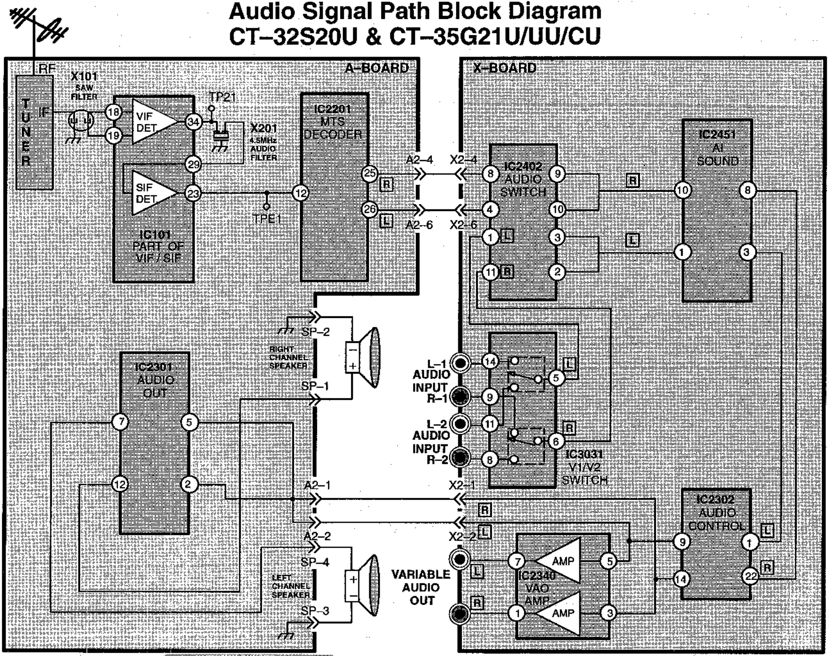

RF
TUNER
IF
X101
SAW FILTER
18
19
VIF DET
34
TP21
X201
4.5MHz AUDIO FILTER
29
SIF DET
23
IC101
PART OF VIF / SIF
TPE1
12
IC2201
MTS DECODER
25
26
R
L
A–BOARD
A2–4
A2–6
X2–4
X2–6
X–BOARD
IC2402
AUDIO SWITCH
8
4
1
11
9
10
3
2
IC2451
AI SOUND
10
1
8
3
SP–2
RIGHT CHANNEL SPEAKER
SP–1
IC2301
AUDIO OUT
7
5
12
2
L–1
AUDIO INPUT
R–1
L–2
AUDIO INPUT
R–2
14
9
11
8
5
6
IC3031
V1/V2
SWITCH
A2–1
X2–1
A2–2
X2–2
SP–4
LEFT CHANNEL SPEAKER
SP–3
VARIABLE AUDIO OUT
IC2340
VAO AMP
AMP
AMP
7
1
5
3
IC2302
AUDIO CONTROL
9
14
1
22
L
R

Figure 42. **Audio Signal Path Block Diagram**

Video–Chroma Signal Path Block Diagram

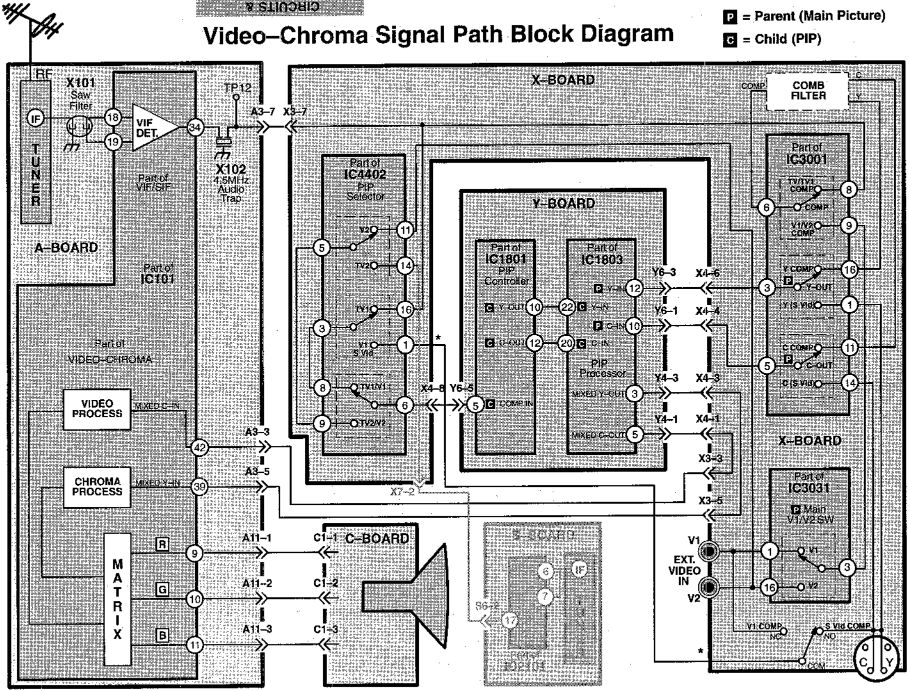
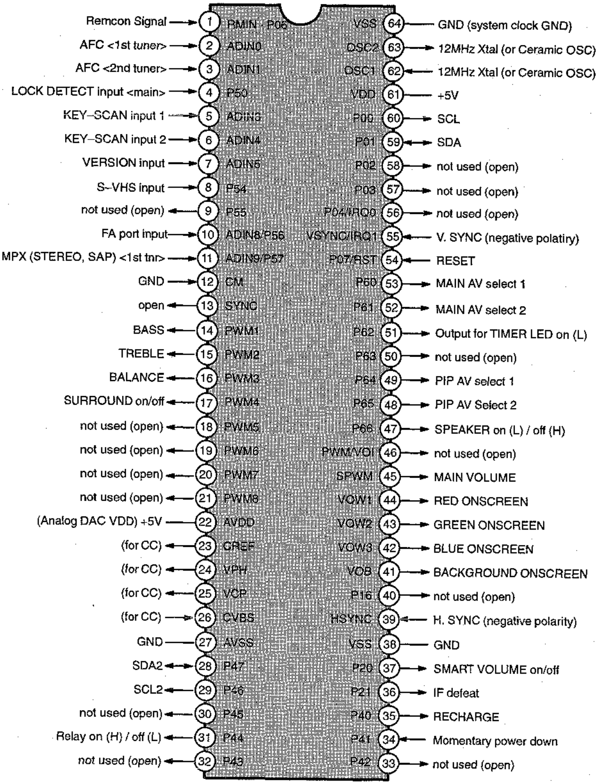

P = Parent (Main Picture)
C = Child (PIP)
RF
IF
TUNER
X101
Saw
Filter
18
19
VIF
DET.
34
TP12
X102
4.5MHz
Audio
Trap
Part of
VIF/SIF
A-BOARD
Part of
IC101
Part of
VIDEO–CHROMA
VIDEO
PROCESS
MIXED C-IN
42
CHROMA
PROCESS
MIXED Y-IN
39
MATRIX
R
G
B
9
10
11
A3–7
X3–7
A3–3
A3–5
A11–1
A11–2
A11–3
C1–1
C1–2
C1–3
C–BOARD
X–BOARD
Part of
IC4402
PIP
Selector
V2
TV2
TV1
V1
S Vid
TV1/V1
TV2/V2
5
3
8
9
11
14
16
1
6
X4–8
Y6–5
X7–2
Y–BOARD
Part of
IC1801
PIP
Controller
C Y-OUT 10
C C-OUT 12
5 C COMP IN
Part of
IC1803
P Y-IN 12
22 C Y-IN
P C-IN 10
20 C C-IN
PIP
Processor
MIXED Y-OUT 3
MIXED C-OUT 5
Y6–3
Y6–1
Y4–3
Y4–1
X4–6
X4–4
X4–3
X4–1
X3–3
X3–5
COMP
COMB
FILTER
C
Y
Part of
IC3001
TV/TV1
COMP
COMP
V1/V2
COMP
Y COMP
P
Y-OUT
Y (S Vid)
C COMP
P
C-OUT
C (S Vid)
6
8
9
3
16
1
5
11
14
X–BOARD
Part of
IC3031
P Main
V1/V2 SW
V1
V2
1
16
3
V1
EXT.
VIDEO
IN
V2
V1 COMP
NC
S Vid COMP
NO
COM
C
Y
S6–2
17
6
7
IF
*
*

Figure 43. **Chroma Signal Path Block Diagram**

*** Trace is on X–Board**

Notes

IC001 MPU IN/OUT Pins and Functions
MN1873265T6E & MN1873265T6F

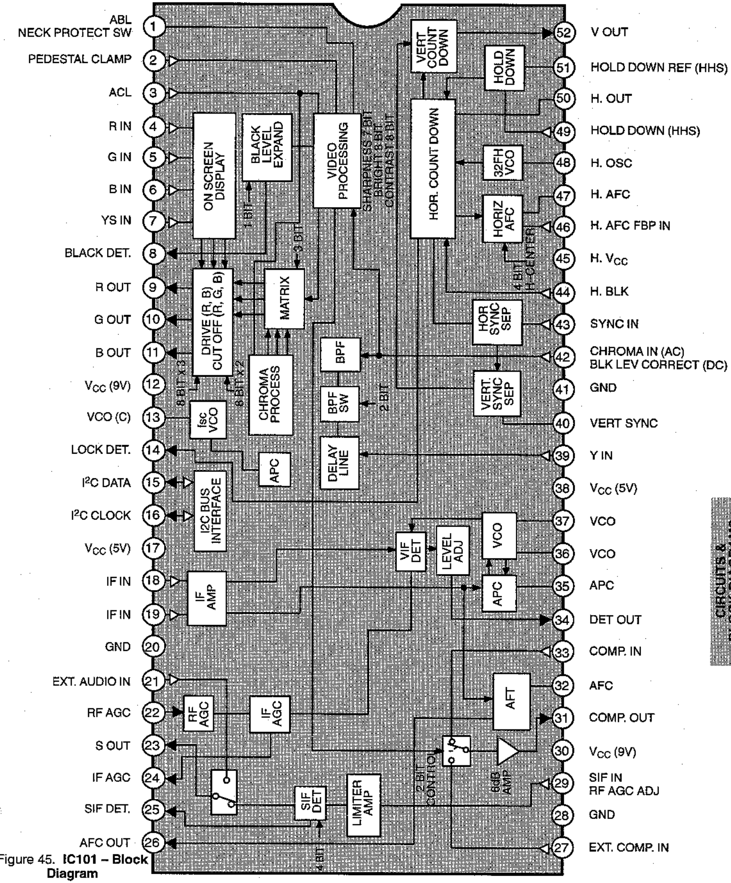


Function	Pin	Name	Name	Pin	Function
Remcon Signal →	1	RMIN · P06	VSS	64	— GND (system clock GND)
AFC <1st tuner> →	2	ADIN0	OSC2	63	→ 12MHz Xtal (or Ceramic OSC)
AFC <2nd tuner> →	3	ADIN1	OSC1	62	← 12MHz Xtal (or Ceramic OSC)
LOCK DETECT input <main> →	4	P50	VDD	61	— +5V
KEY–SCAN input 1 →	5	ADIN3	P00	60	→ SCL
KEY–SCAN input 2 →	6	ADIN4	P01	59	↔ SDA
VERSION input →	7	ADIN5	P02	58	→ not used (open)
S–VHS input →	8	P54	P03	57	→ not used (open)
not used (open) ←	9	P55	P04/IRQ0	56	→ not used (open)
FA port input →	10	ADIN8/P56	VSYNC/IRQ1	55	← V. SYNC (negative polatiry)
MPX (STEREO, SAP) <1st tnr> →	11	ADIN9/P57	P07/RST	54	← RESET
GND →	12	CM	P60	53	→ MAIN AV select 1
open ←	13	SYNC	P61	52	→ MAIN AV select 2
BASS ←	14	PWM1	P62	51	→ Output for TIMER LED on (L)
TREBLE ←	15	PWM2	P63	50	→ not used (open)
BALANCE ←	16	PWM3	P64	49	→ PIP AV select 1
SURROUND on/off ←	17	PWM4	P65	48	→ PIP AV Select 2
not used (open) ←	18	PWM5	P66	47	→ SPEAKER on (L) / off (H)
not used (open) ←	19	PWM6	PWM/VOI	46	→ not used (open)
not used (open) ←	20	PWM7	SPWM	45	→ MAIN VOLUME
not used (open) ←	21	PWM8	VOW1	44	→ RED ONSCREEN
(Analog DAC VDD) +5V —	22	AVDD	VOW2	43	→ GREEN ONSCREEN
(for CC) ←	23	CREF	VOW3	42	→ BLUE ONSCREEN
(for CC) ←	24	VPH	VOB	41	→ BACKGROUND ONSCREEN
(for CC) ←	25	VCP	P16	40	→ not used (open)
(for CC) →	26	CVBS	HSYNC	39	← H. SYNC (negative polarity)
GND —	27	AVSS	VSS	38	— GND
SDA2 ↔	28	P47	P20	37	→ SMART VOLUME on/off
SCL2 ←	29	P46	P21	36	→ IF defeat
not used (open) ←	30	P45	P40	35	→ RECHARGE
Relay on (H) / off (L) ←	31	P44	P41	34	← Momentary power down
not used (open) ←	32	P43	P42	33	→ not used (open)

Figure 44. **Microprocessor IC**

IC101 Block Diagram

INPUT PINS = ◁ ▷ OUTPUT PINS = ◀ ▶



ABL
NECK PROTECT SW
1
PEDESTAL CLAMP
2
ACL
3
R IN
4
G IN
5
B IN
6
YS IN
7
BLACK DET.
8
R OUT
9
G OUT
10
B OUT
11
V_{CC} (9V)
12
VCO (C)
13
LOCK DET.
14
I^2C DATA
15
I^2C CLOCK
16
V_{CC} (5V)
17
IF IN
18
IF IN
19
GND
20
EXT. AUDIO IN
21
RF AGC
22
S OUT
23
IF AGC
24
SIF DET.
25
AFC OUT
26
52
V OUT
51
HOLD DOWN REF (HHS)
50
H. OUT
49
HOLD DOWN (HHS)
48
H. OSC
47
H. AFC
46
H. AFC FBP IN
45
H. V_{CC}
44
H. BLK
43
SYNC IN
42
CHROMA IN (AC)
BLK LEV CORRECT (DC)
41
GND
40
VERT SYNC
39
Y IN
38
V_{CC} (5V)
37
VCO
36
VCO
35
APC
34
DET OUT
33
COMP. IN
32
AFC
31
COMP. OUT
30
V_{CC} (9V)
29
SIF IN
RF AGC ADJ
28
GND
27
EXT. COMP. IN
ON SCREEN DISPLAY
BLACK LEVEL EXPAND
VIDEO PROCESSING
SHARPNESS 7 BIT
BRIGHT 8 BIT
CONTRAST 8 BIT
VERT COUNT DOWN
HOLD DOWN
HOR. COUNT DOWN
32FH VCO
HORIZ AFC
4 BIT
H-CENTER
1 BIT
3 BIT
DRIVE (R, B)
CUT OFF (R, G, B)
MATRIX
HOR SYNC SEP
VERT. SYNC SEP
BPF
BPF SW
2 BIT
CHROMA PROCESS
8 BIT x 3
8 BIT x 2
fsc VCO
APC
DELAY LINE
I2C BUS INTERFACE
VIF DET
LEVEL ADJ
VCO
APC
IF AMP
AFT
RF AGC
IF AGC
2 BIT CONTROL
6dB AMP
SIF DET
LIMITER AMP
4 BIT

Figure 45. **IC101 – Block Diagram**

REPLACEMENT PARTS LIST

(Models: CT–32S20U, CT–35G21U/UU/CU, and CT–35G31U/UU)

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF. NO.	PART NO.	DESCRIPTION
		CAPRISTORS
CRA802	EXNG131P365	RES–CAP 130PF/3.6 MEG
CRA803	**EXNG131P365**	**RES–CAP 130PF/3.6 MEG**
		CAPACITORS
C002	TACCX103T50V	CAP,C .01UF/50V
C004	ECA1HM010	CAP,E 1.0UF/50V
C006	TACCW101T50V	CAP,C 100PF/50V
C007	TACCW101T50V	CAP,C 100PF/50V
C008	TACCX103T50V	CAP,C .01UF/50V
C009	ECA0JM101	CAP,E 100UF/6.3V
C010	TACCX103T50V	CAP,C .01UF/50V
C013	ECA0JM101	CAP,E 100UF/6.3V
C014	TACCW221T50V	CAP,C 220PF/50V
C017	TACCQ330T50V	CAP,C 33PF/50V
C018	TACCQ330T50V	CAP,C 33PF/50V
C019	ECA0JM101	CAP,E 100UF/6.3V
C020	ECA0JM471	CAP,E 470UF/6.3V
C021	TACCV561T50V	CAP,C 560PF/50V
C022	ECA1CM471	CAP,E 470UF/16V
C023	TACCX103T50V	CAP,C .01UF/50V
C024	ECA1HM4R7	CAP,E 4.7UF/50V
C026	ECA1CM102	CAP,E 1000UF/16V
C032	TACCX103T50V	CAP,C .01UF/50V
C036	ECKF1H103ZF	CAP,C .01UF–Z–50V CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
C036	TACCW222T50V	CAP,C 2200PF/50V
C037	ECEA1CFS470	CAP,E 47UF/16V CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
C040	ECA1CM470	CAP,E 47UF/16V CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
C043	TACCW101T50V	CAP,C 100PF/50V
C044	TACCW101T50V	CAP,C 100PF/50V
C057	TACCW101T50V	CAP,C 100PF/50V
C058	TACCW101T50V	CAP,C 100PF/50V
C059	TACCW101T50V	CAP,C 100PF/50V
C102	ECA1CM100	CAP,E 10UF/16V
C104	ECA1HMR22	CAP,E .22UF/50V
C105	TACCQ270T50V	CAP,C 27PF/50V
C106	TACCW122T50V	CAP,C 1200PF/50V
C107	ECA1HMR47	CAP,E .47UF/50V
C109	ECA0JM471	CAP,E 470UF/6.3V
C110	TACCX103T50V	CAP,C .01UF/50V
C111	TACCR010T50V	CAP,C 10PF/50V
C115	TACCX103T50V	CAP,C .01UF/50V
C117	TACCV470T50V	CAP,C 47PF/50V
C126	ECA1CM331	CAP,E 330UF/16V
C151	ECA1HMR22	CAP,E .22UF/50V
C152	TACCQ680T50V	CAP,C 68PF/50V
C153	TACCQ150T50V	CAP,C 15PF/50V
C201	ECCF1H680JP	CAP,C 68PF–J–50V
C202	TACCX103T50V	CAP,C .01UF/50V
C203	TACCX103T50V	CAP,C .01UF/50V
C301	ECEA1CN100U	CAP,E 10UF–16V
C302	ECA1CM331	CAP,E 330UF/16V
C303	ECA1CM220	CAP,E 22UF/16V
C304	ECA1HM010	CAP,E 1.0UF/50V CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
C304	ECA1HM4R7	CAP,E 4.7UF/50V CT–32S20U
C305	ECA1HMR33	CAP,E .33UF/50V
C306	ECA1HM4R7	CAP,E 4.7UF/50V
C308	ECQB1H223JF	CAP,P .022UF–J–50V
C309	ECEA1HN010U	CAP,E 1UF–50V
C310	ECA1CM100	CAP,E 10UF/16V
C311	ECQB1H473JF	CAP,P .047UF–J–50V
C312	ECA1CM220	CAP,E 22UF/16V
C313	TACCV390T50V	CAP,C 39PF/50V
C315	TACCW151T50V	CAP,C 150PF/50V CT–32S20U
C316	TACCW181T50V	CAP,C 180PF/50V
C351	ECKD3D102KB	CAP,C .001UF–K–2KV CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
C351	TACCW561T50V	CAP,C 560PF/50V CT–32S20U
C352	ECEA1HN010U	CAP,E 1UF–50V CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
C352	TACCW561T50V	CAP,C 560PF/50V CT–32S20U
C353	TACCW681T50V	CAP,C 680PF/50V CT–32S20U
C353	TACCW821T50V	CAP,C 820PF/50V CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
C354	TACCW821T50V	CAP,C 820PF/50V CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
C355	ECKD3D102KB	CAP,C .001UF–K–2KV CT–32S20U
C355	TACCW561T50V	CAP,C 560PF/50V CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
C356	ECA1CM100	CAP,E 10UF/16V CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
C357	ECKD2H821KB	CAP,C 820PF–K–500V CT–35G21U CT–35G21UU

REPLACEMENT PARTS LIST

(Models: CT–32S20U, CT–35G21U/UU/CU, and CT–35G31U/UU)

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REF. NO.	PART NO.	DESCRIPTION
		CT–35G21CUCT–35G31U CT–35G31UU
C357	TACCX103T50V	CAP,C .01UF/50V CT–32S20U
C364	ECA1CM100	CAP,E 10UF/16V CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
C365	TACCW102T50V	CAP,C .001UF/50V CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
C366	ECKD2H332KB	CAP,C.0033UF–K–500V CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
C370	ECKD2H821KB	CAP,C820PF–K–500V CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
C371	ECA1CM100	CAP,E 10UF/16V CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
C373	TACCQ470T50V	CAP,C 47PF–J–50V CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
C374	TACCV470T50V	CAP,C 47PF/50V CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
C375	TACCQ470T50V	CAP,C 47PF–J–50V CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
C401	ECA1HMR33	CAP,E .33UF/50V
C402	TACCW331T50V	CAP,C 330PF/50V
C403	ECEA1HNR47U	CAP,E .47UF–50V
C451	**ECEA1CGE221**	**CAP,E 220UF/16V**
C452	ECSF1EE105	CAP,T 1.0UF/25V
C453	ECEA1HFS2R2	CAP,E 2.2UF/50V
C454	ECEA1EGE102	CAP,E 1000UF/25V
C455	ECEA1VGE101	CAP,E 100UF/35V
C456	ECQV1H224JM	CAP,P .22UF–J–50V
C457	ECEA1HFS100	CAP,E 10UF–50V
C458	ECA1HM4R7	CAP,E 4.7UF/50V
C460	ECEA1HGE010	CAP,E 1UF/50V
C461	ECQM1104JZ	CAP,P .1UF–J–100V
C462	ECEA1VGE471	CAP,E 470UF/35V
C501	TACCW821T50V	CAP,C 820PF/50V
C502	ECA1HM2R2	CAP,E 2.2UF/50V
C503	ECQB1H153JF	CAP,P .015UF–J–50V
C504	ECQB1H103JF	CAP,P .01UF–J–50V
C505	ECQB1H223JF	CAP,P .022UF–J–50V
C506	ECA1CM221	CAP,E 220UF/16V

REF. NO.	PART NO.	DESCRIPTION
C507	TACCW221T50V	CAP,C 220PF/50V
C509	ECCF1H221JU	CAP,C 220PF–J–50V
C510	ECCD2H100D	CAP,C 10PF–D–500V
C511	ECKD3A821KB	CAP,C 820PF–K–1KVDC
C512	**ECEA160V33Z**	**CAP,E 33UF/160V**
C515	ECKD3A101KB	CAP,C 100PF–K–1KV
C517	TACCX103T50V	CAP,C .01UF/50V
C531	**ECA1EM330**	**CAP,E 33UF/25V**
C532	ECA1CM220	CAP,E 22UF/16V
C552	TACCX103T50V	CAP,C .01UF/50V
C555	ECEA2EU220	CAP,E 22UF/250V
C558	ECA1CM471	CAP,E 470UF/16V
C559	ECA2AM220	CAP,E 22UF/100V
C560	ECEA1HN2R2U	CAP,E 2.2UF/50V
C563	**TAC4R6B133JC**	**CAP,P .013UF/1200V**
C564	**TAC4S6B332JC**	**CAP,P 3300PF/1200V**
C565	ECKD3D221JB	CAP,C 220PF–J–2KV CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
C566	**ECKD3D181JB**	**CAP,C 180PF–J–2KV**
C568	ECQM4473JZ	CAP,P .047UF–J–400V
C569	**ECQF2H434JS**	**CAP,P .43UF–J–200V** **CT–32S20U**
C569	**ECQF2H564JS**	**CAP,P .56UF–J–200V** **CT–35G21U CT–35G21UU** **CT–35G21CU CT–35G31U** **CT–35G31UU**
C571	ECQM4562JZ	CAP,P 5600UF–J–400V
C572	ECEA1EGE100	CAP,E 10UF/25V
C573	ECA1EM100	CAP,E 10UF/25V
C574	ECKD2H561KB	CAP,C 560PF–K–500V
C575	ECA0JM222	CAP,E 2200UF/6.3V
C601	TACCV101T50V	CAP,C 100PF/50V
C602	ECCF1H150JU	CAP,C 15PF–J–50V
C607	TACCV101T50V	CAP,C 100PF/50V
C754	ECQB1H104KF	CAP,P .1UF–K–50V
C755	ECQB1H104KF	CAP,P .1UF–K–50V
C756	ECA0JM221	CAP,E 220UF–6.3V
C757	ECA1VM102	CAP,E 1000UF/35V
C759	ECQE1395KN	CAP,P 3.9UF–K–100V
C801	ECKDAE472ZE	CAP,C4700PF–Z–250V
C802	ECKDAE472ZE	CAP,C4700PF–Z–250V
C803	ECKD2H472PU	CAP,C .0047UF–P–500V
C804	ECKDAE472ZE	CAP,C4700PF–Z–250V
C805	**EC0S2DA471B4**	**CAP,E 470UF/160V**
C806	**ECQU2A153MN**	**CAP,P.015UF–M–250VAC**
C807	**ECQU2A153MN**	**CAP,P.015UF–M–250VAC**
C809	ECEA1JFS220	CAP,E 22UF/63V
C810	ECQM2473KZ	CAP,P .047UF–K–200V
C811	ECKD3A102KB	CAP,C .001UF–K–1KV
C812	ECKD3A102KB	CAP,C .001UF–K–1KV
C813	ECKD2H152KB	CAP,C .0015UF–K–500V
C814	**ECQU2A224MN**	**CAP,P.22UF–M–250VAC**
C815	ECQB1H273JF	CAP,P .027UF–J–50V
C816	ECKD3A152KB	CAP,C .0015UF–K–1KV

REPLACEMENT PARTS LIST

(Models: CT–32S20U, CT–35G21U/UU/CU, and CT–35G31U/UU)

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REF. NO.	PART NO.	DESCRIPTION
C817	ECKD3A102KB	CAP,C .001UF–K–1KV
C818	**EC0S2DA221B4**	**CAP,E 220UF/200V**
C819	ECKD2H391KB	CAP,C 390PF–K–500V
C821	ECKD3A102KB	CAP,C .001UF–K–1KV
C822	**ECEA1EGE102**	**CAP,E 1000UF/25V**
C823	ECKD3A561KB	CAP,C 560PF–K–1KV
C824	ECEA1EGE222	CAP,E 2200UF/25V
C828	ECQB1H473JF	CAP,P .047UF–J–50V
C829	ECKD2H331KB	CAP,C 330PF–K–500V
C831	ECA1VM102	CAP,E 1000UF/35V
C968	TACCX103T50V	CAP,C .01UF/50V CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
C969	ECA1CM100	CAP,E 10UF/16V CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
C1021	ECEA1AFS470	CAP,E 47UF/10V CT–32S20U
C1022	ECKF1H103ZF	CAP,C .01UF–Z–50V CT–32S20U
C1051	TACCW101T50V	CAP,C 100PF/50V
C1801	ECEA1HKA010	CAP,E 1.0UF/50V
C1802	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C1803	ECEA1HKA010	CAP,E 1.0UF/50V
C1805	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C1806	ECEA1CKA100	CAP,E 10UF/16V
C1807	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C1808	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C1809	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C1810	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C1811	ECEA1EKA4R7	CAP,E 4.7UF/25V
C1812	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C1813	ECEA0JKA331Q	CAP,E 330UF/6.3V
C1814	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C1820	ECUX1H390JCX	CAP,C 39PF–J–50V
C1837	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C1838	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C2104	ECA1CM102	CAP,E 1000UF/16V CT–35G31U CT–35G31UU
C2105	ECA0JM101	CAP,E 100UF/6.3V CT–35G31U CT–35G31UU
C2106	ECA1HMR47	CAP,E .47UF/50V CT–35G31U CT–35G31UU
C2108	ECA1CM330	CAP,E 33UF/16V CT–35G31U CT–35G31UU
C2109	ECUX1H103ZFX	CAP,C .01UF–Z–50V CT–35G31U CT–35G31UU
C2111	ECEA1HFSR22	CAP,E .22UF/50V CT–35G31U CT–35G31UU
C2114	ECUX1H103ZFX	CAP,C .01UF–Z–50V CT–35G31U CT–35G31UU
C2115	ECA1HM100	CAP,E 10UF/50V CT–35G31U CT–35G31UU
C2116	ECUX1H103ZFX	CAP,C .01UF–Z–50V CT–35G31U CT–35G31UU
C2118	ECUX1H270JCX	CAP,C 27PF–J–50V CT–35G31U CT–35G31UU
C2119	ECUX1H103ZFX	CAP,C .01UF–Z–50V CT–35G31U CT–35G31UU
C2120	ECEA1HFSR47	CAP,E .47UF/50V CT–35G31U CT–35G31UU
C2121	ECUX1H103ZFX	CAP,C .01UF–Z–50V CT–35G31U CT–35G31UU
C2123	ECUX1H270JCX	CAP,C 27PF–J–50V CT–35G31U CT–35G31UU
C2124	ECUX1H103ZFX	CAP,C .01UF–Z–50V CT–35G31U CT–35G31UU
C2125	ECA1CM100	CAP,E 10UF/16V CT–35G31U CT–35G31UU
C2126	ECA1HMR22	CAP,E .22UF/50V CT–35G31U CT–35G31UU
C2201	AP335K016CAE	CAP,T 3.3UF/16V
C2202	ECEA1HGE4R7	CAP,E 4.7UF–50V
C2203	ECA1HM010	CAP,E 1.0UF/50V
C2204	ECA1HM4R7	CAP,E 4.7UF/50V
C2205	ECEA1HGE4R7	CAP,E 4.7UF–50V
C2206	ECEA1HGE4R7	CAP,E 4.7UF–50V
C2207	ECA1HM4R7	CAP,E 4.7UF/50V
C2208	ECA1HM4R7	CAP,E 4.7UF/50V
C2209	ECA1CM101	CAP,E 100UF/16V
C2210	ECA1HMR33	CAP,E .33UF/50V
C2211	ECQB1H104JF	CAP,P .1UF–J–50V
C2212	ECQB1H104JF	CAP,P .1UF–J–50V
C2213	ECQB1H104JF	CAP,P .1UF–J–50V
C2214	ECQB1H104JF	CAP,P .1UF–J–50V
C2215	ECQB1H223JF	CAP,P .022UF–J–50V
C2216	TACCW332T50V	CAP,C .0033UF/50V
C2219	AP106K016CAE	CAP,T 10UF/16V
C2301	ECA1EM102	CAP,E 1000UF/25V
C2302	ECA1HM010	CAP,E 1.0UF/50V
C2303	TACCW392T50V	CAP,C 3900PF/50V
C2304	TACCW392T50V	CAP,C 3900PF/50V
C2305	ECA1HM010	CAP,E 1.0UF/50V
C2306	ECA1CM102	CAP,E 1000UF/16V
C2307	ECA1CM102	CAP,E 1000UF/16V
C2308	ECEA1EN470U	CAP,E 47UF/25V
C2309	ECQB1H104JF	CAP,P .1UF–J–50V
C2310	ECEA1CN100U	CAP,E 10UF–16V
C2311	ECEA1EN470U	CAP,E 47UF/25V
C2312	ECA1EM101	CAP,E 100UF/25V
C2313	ECA1EM101	CAP,E 100UF/25V
C2314	ECQB1H104JF	CAP,P .1UF–J–50V
C2315	ECA1EM100	CAP,E 10UF/25V
C2316	ECA1CM101	CAP,E 100UF/16V
C2318	TACCW332T50V	CAP,C .0033UF/50V
C2319	TACCW332T50V	CAP,C .0033UF/50V
C2320	ECA1CM222	CAP,E 2200UF–16V
C2321	ECA1HM010	CAP,E 1.0UF/50V
C2322	ECA1CM100	CAP,E 10UF/16V
C2323	ECUX1H103KBX	CAP,C .01UF–K–50V

REPLACEMENT PARTS LIST

(Models: CT–32S20U, CT–35G21U/UU/CU, and CT–35G31U/UU)

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REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION
C2324	ECQB1H683JF	CAP,P .068UF–J–50V	C3037	ECA1CM470	CAP,E 47UF/16V
C2325	ECEA1HN3R3U	CAP,E 3.3UF–50V	C3071	ECA1CM220	CAP,E 22UF/16V
C2326	ECEA1HN3R3U	CAP,E 3.3UF–50V	C3072	ECUX1H103KBX	CAP,C .01UF–K–50V
C2327	ECUX1H103KBX	CAP,C .01UF–K–50V	C3201	ECA1CM470	CAP,E 47UF/16V
C2328	ECQB1H683JF	CAP,P .068UF–J–50V	C3202	ECQB1H473JF	CAP,P .047UF–J–50V
C2331	ECA1CM100	CAP,E 10UF/16V	C3203	ECUX1H103KBX	CAP,C .01UF–K–50V
C2332	ECA1CM100	CAP,E 10UF/16V	C3204	ECUX1H103KBX	CAP,C .01UF–K–50V
C2333	ECA1CM100	CAP,E 10UF/16V	C3206	ECEA1AN220U	CAP,E 22UF–10V
C2334	ECA1HM010	CAP,E 1.0UF/50V	C3207	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C2335	ECA1HM010	CAP,E 1.0UF/50V	C3208	ECUX1H101JCX	CAP,C 100PF–J–50V
C2340	ECA1CM100	CAP,E 10UF/16V	C3209	ECUX1H121JCX	CAP,C 120PF–J–50V
C2341	ECA1CM100	CAP,E 10UF/16V	C3212	ECUX1H390JCX	CAP,C 39PF–J–50V
C2342	ECA1HM010	CAP,E 1.0UF/50V	C4353	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C2343	ECA1HM010	CAP,E 1.0UF/50V	C4354	ECEA1CKA220	CAP,E 22UF/16V
C2344	ECA1CM221	CAP,E 220UF/16V	C4355	ECEA1CKA100	CAP,E 10UF/16V
C2347	ECA1CM221	CAP,E 220UF/16V	C4356	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C2348	ECA1CM102	CAP,E 1000UF/16V	C4357	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C2403	ECA1CM470	CAP,E 47UF/16V	C4358	ECA1CM470	CAP,E 47UF/16V
		CT–35G31U CT–35G31UU	C4359	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C2404	ECA1HM010	CAP,E 1.0UF/50V	C4360	ECEA1CKA220	CAP,E 22UF/16V
		CT–35G31U CT–35G31UU	C4361	ECEA1HKA2R2	CAP,E 2.2UF/50V
C2405	ECA1CM100	CAP,E 10UF/16V	C4362	ECUX1H103ZFX	CAP,C .01UF–Z–50V
		CT–35G31U CT–35G31UU	C4363	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C2406	ECQB1H823JF	CAP,P .082UF–J–50V	C4364	ECEA1HKA3R3	CAP,E 3.3UF/50V
		CT–35G31U CT–35G31UU	C4365	ECEA1HKAR47	CAP,E .47UF/50V
C2407	ECQB1H104JF	CAP,P .1UF–J–50V	C4367	ECUX1H103ZFX	CAP,C .01UF–Z–50V
		CT–35G31U CT–35G31UU	C4368	ECUX1H681KBX	CAP,C 680PF–K–50V
C2408	ECUX1H222KBX	CAP,C .0022UF–K–50V	C4369	ECEA1HKAR47	CAP,E .47UF/50V
		CT–35G31U CT–35G31UU	C4370	ECUX1H391KBX	CAP,C 390PF–K–50V
C2409	ECUX1H223KBX	CAP,C .022UF–K–50V	C4371	ECEA1HN010U	CAP,E 1UF–50V
		CT–35G31U CT–35G31UU	C4374	ECUX1H122JCX	CAP,C .0012UF–J–50V
C2410	ECUX1H223KBX	CAP,C .022UF–K–50V	C4375	ECEA1HKA010	CAP,E 1.0UF/50V
		CT–35G31U CT–35G31UU	C4380	ECRHA030E81	TRIMMER: 30PF
C2451	ECA1CM100	CAP,E 10UF/16V	C4390	ECA0JM331	CAP,E 330UF/6.3V
C2452	ECA1CM100	CAP,E 10UF/16V	C4407	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C2453	ECA1HM4R7	CAP,E 4.7UF/50V	C4408	ECUX1H101JCX	CAP,C 100PF–J–50V
C2455	ECEA1HN010U	CAP,E 1UF–50V	C4411	ECA1CM100	CAP,E 10UF/16V
		CT–35G31U CT–35G31UU	C4412	ECEA1CN100U	CAP,E 10UF–16V
C2456	ECEA1HN010U	CAP,E 1UF–50V	C4414	ECEA1CN100U	CAP,E 10UF–16V
		CT–35G31U CT–35G31UU	C4415	ECA1CM100	CAP,E 10UF/16V
C2457	ECA1HM4R7	CAP,E 4.7UF/50V	C4416	ECA1CM100	CAP,E 10UF/16V
C2458	ECA1HM4R7	CAP,E 4.7UF/50V	C4420	ECUX1H820JCX	CAP,C 82PF–J–50V
C3001	ECA1HM010	CAP,E 1.0UF/50V			**DIODES**
C3002	ECA1HM010	CAP,E 1.0UF/50V	D001	ERA15–01	DIODE
C3003	ECA1CM100	CAP,E 10UF/16V	D002	MA167	DIODE
C3004	ECA1CM220	CAP,E 22UF/16V	D003	MTZJT–774.7B	DIODE, ZENER
C3005	ECA1CM220	CAP,E 22UF/16V	D004	MTZJT–776.2C	DIODE, ZENER
C3006	ECA1CM470	CAP,E 47UF/16V	D005	MA165	DIODE
C3007	ECUX1H103KBX	CAP,C .01UF–K–50V	D006	MA165	DIODE
C3008	ECUX1H151JCX	CAP,C 150PF–J–50V	D007	MA165	DIODE
C3031	ECA1CM100	CAP,E 10UF/16V	D024	MTZJT–7736B	DIODE, ZENER
C3032	ECA1CM100	CAP,E 10UF/16V	D026	MTZJT–776.2A	DIODE, ZENER
C3033	ECUX1H103ZFX	CAP,C .01UF–Z–50V	D352	MTZJT–776.2A	DIODE, ZENER
C3034	ECA1HM010	CAP,E 1.0UF/50V			CT–32S20U
C3035	ECA1HM010	CAP,E 1.0UF/50V	D353	MTZJT–776.2A	DIODE, ZENER
C3036	ECUX1H103ZFX	CAP,C .01UF–Z–50V			CT–32S20U

REPLACEMENT PARTS LIST

(Models: CT–32S20U, CT–35G21U/UU/CU, and CT–35G31U/UU)

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REF NO.	PART NO.	DESCRIPTION
D355	MTZJT–776.2A	DIODE, ZENER CT–32S20U
D366	MA165	DIODE CT–35G21U CT–35G21UU CT–35G21CU CT–35G31U CT–35G31UU
D367	MTZJT–775.6B	DIODE, ZENER CT–35G21U CT–35G21UU CT–35G21CU CT–35G31U CT–35G31UU
D368	MTZJT–775.6B	DIODE, ZENER CT–35G21U CT–35G21UU CT–35G21CU CT–35G31U CT–35G31UU
D451	ERA15–01	DIODE
D452	MA165	DIODE
D453	MA165	DIODE
D454	MA4120M	DIODE
D455	MTZJT–7712A	DIODE, ZENER
D456	MA165	DIODE
D501	MTZJT–778.2B	DIODE, ZENER
D531	**AS01**	**DIODE**
D532	MTZMT–776.2A	DIODE, ZENER
D554	**AS01**	**DIODE**
D555	MA165	DIODE
D556	MTZJT–7739D	DIODE, ZENER
D558	**RS3FS**	**DIODE**
D559	**TVSRU3MV1**	**DIODE, RECTIFIER**
D560	MA165	DIODE CT–32S20U
D563	MA165	DIODE
D801	**TVSRM11B**	**DIODE**
D802	**TVSRM11B**	**DIODE**
D803	**TVSRM11B**	**DIODE**
D804	**TVSRM11B**	**DIODE**
D805	**TRPW5B0M030D**	**THERMISTOR**
D806	TVSRU1CV	DIODE, RECTIFIER
D807	MTZJT–777.5B	DIODE, ZENER
D808	AU01	DIODE
D809	**RU30ALFS1**	**DIODE, RECTIFIER**
D810	**RU3YX–MLF–C2**	**DIODE**
D811	**RU3YX–MLF–C2**	**DIODE**
D812	**AU02**	**DIODE**
D1801	MA151K	DIODE
D2101	MA3330M	DIODE CT–35G31U CT–35G31UU
D3001	MA151K	DIODE
D3002	MA151K	DIODE
D3071	MA3110M	DIODE, ZENER
D3072	MA3110M	DIODE, ZENER
D3073	MA3110M	DIODE, ZENER
D3074	MA3110M	DIODE, ZENER
D3075	MA3110M	DIODE, ZENER
D3076	MA3110M	DIODE, ZENER
D3077	MA3110M	DIODE, ZENER
D3078	MA3110M	DIODE, ZENER
D3079	MA3110M	DIODE, ZENER
D3080	MA3110M	DIODE, ZENER
D3081	MA3110M	DIODE, ZENER
D3082	MA3110M	DIODE, ZENER
D3083	MA3110M	DIODE, ZENER CT–35G31U CT–35G31UU
D3084	MA3110M	DIODE, ZENER CT–35G31U CT–35G31UU
		FUSES
F801	**0BA1C40NU100**	**FUSE 4.0A/125V**
		INTEGRATED CIRCUITS
IC001	MN1873265T6E	INT CKT CT–35G31U CT–35G31UU
IC001	MN1873265T6F	INT CKT CT–32S20U CT–35G21U CT–35G21UU CT–35G21CU
IC002	24LC02BIP	INT CKT
IC101	**AN5163K**	**INT CKT**
IC451	**LA7836–TV**	**INT CKT**
IC551	**AN78M09**	**PLUS 9V AVR** **CT–32S20U CT–35G21U** **CT–35G21UU CT–35G21CU**
IC551	**AN7809**	**INT CKT** **CT–35G31U CT–35G31UU**
IC552	AN78L12	INT CKT
IC553	AN78M05	PLUS 5V AVR
IC801	**STK730–020**	**INT CKT**
IC1801	M65607SP	INT CKT
IC1802	M4C264AL–12	INT CKT
IC1803	M52694P	INT CKT
IC1804	MN1280R	INT CKT
IC2101	AN5170K	INT CKT CT–35G31U CT–35G31UU
IC2201	AN5818NK	INT CKT
IC2301	AN7147N	INT CKT
IC2302	CXA1279AS	INT CKT
IC2340	BA15218N	INT CKT
IC2401	UPC1891ACY	INT CKT CT–35G31U CT–35G31UU
IC2402	MC14066BCP	INT CKT
IC2451	AN5285K	INT CKT
IC3001	M52055P	INT CKT
IC3031	M52055P	INT CKT
IC4402	M52055P	INT CKT
		COILS
DEG	0LK19049A	COIL, DEGAUSSING 35" CT–35G21U CT–35G21UU CT–35G21CU CT–35G31U CT–35G31UU
DEG	0LK19050	COIL, DEGAUSSING CT–32S20U
DY	**TLYA007**	**YOKE, DEFLECTION** **CT–32S20U**
DY	**KDY42H552F**	**YOKE, DEFLECTION** **CT–35G21U CT–35G21UU** **CT–35G21CU CT–35G31U**

REPLACEMENT PARTS LIST

(Models: CT-32S20U, CT-35G21U/UU/CU, and CT-35G31U/UU)

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REF. NO.	PART NO.	DESCRIPTION
		CT–32S20U CT–35G21U
		CT–35G21UUCT–35G21CU
R053	ERDS2TJ102	RES,C 1K–J–1/4
R054	ERDS2TJ102	RES,C 1K–J–1/4
R055	ERDS2TJ101	RES,C 100–J–1/4
R056	ERDS2TJ101	RES,C 100–J–1/4
R057	ERDS2TJ221	RES,C 220–J–1/4
R058	ERDS2TJ221	RES,C 220–J–1/4
R059	ERDS2TJ221	RES,C 220–J–1/4
R060	ERDS2TJ102	RES,C 1K–J–1/4
R066	ER0S2CKF4302	RES,M43K–F–1/4
		CT–35G21U CT–35G21UU
		CT–35G21CUCT–35G31U
		CT–35G31UU
R071	ERDS2TJ101	RES,C 100–J–1/4
R073	ERDS2TJ103	RES,C 10K–J–1/4
R074	ERG1SJ473P	RES,M 47K–J–1W
R078	ERG1SJ473P	RES,M 47K–J–1W
		CT–35G31U CT–35G31UU
R080	ERD25TJ222	RES,C 2.2K–J–1/4
		CT–35G21U CT–35G21UU
		CT–35G21CUCT–35G31U
		CT–35G31UU
R081	ERD25TJ222	RES,C 2.2K–J–1/4
		CT–35G21U CT–35G21UU
		CT–35G21CUCT–35G31U
		CT–35G31UU
R082	ERDS2TJ103	RES,C 10K–J–1/4
R082	ERD25TJ332	RES,C 3.3K–J–1/4
		CT–35G21U CT–35G21UU
		CT–35G21CUCT–35G31U
		CT–35G31UU
R083	ERD25TJ562	RES,C 5.6K–J–1/4
		CT–35G21U CT–35G21UU
		CT–35G21CUCT–35G31U
		CT–35G31UU
R084	ERD25TJ103	RES,C 10K–J–1/4
		CT–35G21U CT–35G21UU
		CT–35G21CUCT–35G31U
		CT–35G31UU
R093	ERDS2TJ102	RES,C 1K–J–1/4
R101	ERDS2TJ683	RES,C 68K–J–1/4
R103	ERDS2TJ183	RES,C 18K–J–1/4
R104	ERDS2TJ121	RES,C 120–J–1/4
R105	ERDS2TJ102	RES,C 1K–J–1/4
R106	EVND2AA03B14	CONTROL 10K
R107	ERDS2TJ222	RES,C 2.2K–J–1/4
R111	ERDS2TJ361	RES,C 360–J–1/4
R112	ERDS2TJ561	RES,C 560–J–1/4
R113	ERDS2TJ473	RES,C 47K–J–1/4
R114	ERDS2TJ104	RES,C 100K–J–1/4
R115	ERDS2TJ221	RES,C 220–J–1/4
R152	ERDS2TJ154	RES,C 150K–J–1/4
R201	ERDS2TJ221	RES,C 220–J–1/4
R203	ERDS2TJ392	RES,C 3.9K–J–1/4
R304	ERDS2TJ274	RES,C 270K–J–1/4
R305	ERDS2TJ102	RES,C 1K–J–1/4
R306	ERDS2TJ102	RES,C 1K–J–1/4
R313	ERDS2TJ471	RES,C 470–J–1/4
R316	ERDS2TJ682	RES,C 6.8K–J–1/4
R317	ERDS2TJ221	RES,C 220–J–1/4
R319	ERDS2TJ514	RES,C 51OK–J–1/4
R321	ERDS2TJ471	RES,C 470–J–1/4
R323	ERDS2TJ101	RES,C 100–J–1/4
R324	ERDS2TJ331	RES,C 330–J–1/4
R325	ERDS2TJ222	RES,C 2.2K–J–1/4
R326	ERDS2TJ471	RES,C 470–J–1/4
R328	ERDS2TJ332	RES,C 3.3K–J–1/4
R351	ERDS2TJ271	RES,C 270–J–1/4
		CT–35G21U CT–35G21UU
		CT–35G21CUCT–35G31U
		CT–35G31UU
R351	ERG2ANJP123H	RES,M 12K–J–2W
		CT–32S20U
R352	ERDS2TJ271	RES,C 270–J–1/4
		CT–35G21U CT–35G21UU
		CT–35G21CUCT–35G31U
		CT–35G31UU
R352	ERG2ANJP123H	RES,M 12K–J–2W
		CT–32S20U
R353	ERDS2TJ271	RES,C 270–J–1/4
		CT–35G21U CT–35G21UU
		CT–35G21CUCT–35G31U
		CT–35G31UU
R353	ERG2ANJP123H	RES,M 12K–J–2W
		CT–32S20U
R354	ERDS1TJ272	RES,C 2.7K–J–1/2
		CT–32S20U
R354	ERDS2TJ101	RES,C 100–J–1/4
		CT–35G21U CT–35G21UU
		CT–35G21CUCT–35G31U
		CT–35G31UU
R355	ERDS1TJ272	RES,C 2.7K–J–1/2
		CT–32S20U
R355	ERDS2TJ101	RES,C 100–J–1/4
		CT–35G21U CT–35G21UU
		CT–35G21CUCT–35G31U
		CT–35G31UU
R356	ERDS1TJ272	RES,C 2.7K–J–1/2
		CT–32S20U
R356	ERDS2TJ101	RES,C 100–J–1/4
		CT–35G21U CT–35G21UU
		CT–35G21CUCT–35G31U
		CT–35G31UU
R357	ERDS2TJ101	RES,C 100–J–1/4
		CT–35G21U CT–35G21UU
		CT–35G21CUCT–35G31U
		CT–35G31UU
R357	ERDS2TJ241	RES,C 240–J–1/4
		CT–32S20U
R358	ERDS2TJ101	RES,C 100–J–1/4
		CT–35G21U CT–35G21UU

REPLACEMENT PARTS LIST

(Models: CT–32S20U, CT–35G21U/UU/CU, and CT–35G31U/UU)

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REF. NO.	PART NO.	DESCRIPTION
		CT–35G21CUCT–35G31U CT–35G31UU
R358	ERDS2TJ241	RES,C240–J–1/4 CT–32S20U
R359	ERDS2TJ101	RES,C100–J–1/4 CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
R359	ERDS2TJ241	RES,C240–J–1/4 CT–32S20U
R360	ERDS2TJ152	RES,C1.5K–J–1/4 CT–32S20U
R361	ERDS2TJ152	RES,C1.5K–J–1/4 CT–32S20U
R362	ERDS2TJ152	RES,C1.5K–J–1/4 CT–32S20U
R364	ERDS2TJ101	RES,C100–J–1/4 CT–32S20U
R365	ERDS2TJ101	RES,C100–J–1/4 CT–32S20U
R366	ERDS2TJ101	RES,C100–J–1/4 CT–32S20U
R367	ERDS2TJ221	RES,C220–J–1/4 CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
R368	ERDS2TJ221	RES,C220–J–1/4 CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
R369	ERDS2TJ221	RES,C220–J–1/4 CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
R370	ERDS2TJ101	RES,C100–J–1/4 CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
R371	ERDS2TJ471	RES,C470–J–1/4 CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
R372	ERDS2TJ471	RES,C470–J–1/4 CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
R373	ERDS2TJ471	RES,C470–J–1/4 CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
R374	ERG2SJS103H	RES,M10K–J–2W CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
R375	ERG2SJS103H	RES,M10K–J–2W CT–35G21U CT–35G21UU
		CT–35G21CUCT–35G31U CT–35G31UU
R376	ERG2SJS103H	RES,M10K–J–2W CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
R389	ERDS1TJ272	RES,C2.7K–J–1/2 CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
R390	ERDS1TJ272	RES,C2.7K–J–1/2 CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
R391	ERDS1TJ272	RES,C2.7K–J–1/2 CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
R392	ERDS1TJ561	RES,C560–J–1/2 CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
R393	ERQ12AJ101	RES,F100–J–1/2 CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
R395	ERDS1TJ394	RES,C390K–J–1/2 CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
R396	ERD50TJ515	RES,C5.1MEG–J–1/2 CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
R397	ERD50TJ515	RES,C5.1MEG–J–1/2 CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
R399	ERD50TJ515	RES,C5.1MEG–J–1/2 CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
R401	ERDS2TJ224	RES,C220K–J–1/4
R402	ERDS2TJ561	RES,C560–J–1/4
R404	ERDS2TJ221	RES,C220–J–1/4
R451	ERDS2TJ471	RES,C470–J–1/4
R452	ERDS2TJ473	RES,C47K–J–1/4
R453	EVND2AA03B34	CONTROL 30K
R454	ERX1ANJ1R0	RES,M1.0–J–1W CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
R454	ERX1ANJ1R2	RES,M1.2–J–1W CT–32S20U
R455	ERDS2TJ333	RES,C33K–J–1/4
R456	ERDS2TJ273	RES,C27K–J–1/4

REPLACEMENT PARTS LIST

(Models: CT–32S20U, CT–35G21U/UU/CU, and CT–35G31U/UU)

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REF. NO.	PART NO.	DESCRIPTION
R457	ERDS2TJ102	RES,C 1K–J–1/4
R458	ERDS2TJ223	RES,C 22K–J–1/4 CT–32S20U
R458	ERDS2TJ273	RES,C 27K–J–1/4 CT–35G21U CT–35G21UU CT–35G21CU CT–35G31U CT–35G31UU
R459	ERDS2TJ102	RES,C 1K–J–1/4
R460	ERDS2TJ103	RES,C 10K–J–1/4
R461	ERDS2TJ102	RES,C 1K–J–1/4 CT–32S20U
R462	ERDS2TJ473	RES,C 47K–J–1/4
R463	ERDS2TJ224	RES,C 220K–J–1/4
R464	ERDS2TJ124	RES,C 120K–J–1/4
R465	ERDS1FJ1R5	RES,C 1.5–J–1/2
R466	ERDS2TJ101	RES,C 100–J–1/4
R467	ERDS2TJ102	RES,C 1K–J–1/4
R470	ERDS2TJ153	RES,C 15K–J–1/4
R471	ERDS2TJ271	RES,C 270–J–1/4
R473	ERDS2TJ102	RES,C 1K–J–1/4 CT–35G21U CT–35G21UU CT–35G21CU CT–35G31U CT–35G31UU
R501	ERDS2TJ102	RES,C 1K–J–1/4
R502	ERDS2TJ272	RES,C 2.7K–J–1/4
R503	ERDS2TJ182	RES,C 1.8K–J–1/4
R504	ERDS2TJ561	RES,C 560–J–1/4
R505	ERDS2TJ561	RES,C 560–J–1/4
R506	ERDS2TJ100	RES,C 10–J–1/4
R507	ERDS2TJ562	RES,C 5.6K–J–1/4
R508	ERDS2TJ562	RES,C 5.6K–J–1/4
R509	ERG2ANJP562H	RES,M 5.6K–J–2W
R510	**ERG3ANJ242**	**RES,M 2.4K–J–3W**
R511	**ERG3ANJ242**	**RES,M 2.4K–J–3W**
R514	ERDS2TJ561	RES,C 560–J–1/4
R515	ERDS2TJ224	RES,C 220K–J–1/4
R531	**ERD25FJ470**	**RES,C 47–J–1/4**
R532	**ER0S2CKF5362**	**RES,M 53.6K–F–1/4**
R533	**ER0S2CKF6491**	**RES,M 6.49K–F–1/4**
R534	ERDS2TJ684	RES,C 680K–J–1/4
R538	ERDS2TJ821	RES,C 820–J–1/4
R539	**ERDS2TJ681**	**RES,C 680–J–1/4**
R540	ERDS2TJ101	RES,C 100–J–1/4
R551	ERQ2CJ4R7	RES,F 4.7–J–2W CT–35G31U CT–35G31UU
R551	ERX1ANJ1R0	RES,M 1.0–J–1W CT–32S20U CT–35G21U CT–35G21UU CT–35G21CU
R552	ERG3SJS101H	RES,M 100–J–3W CT–35G31U CT–35G31UU
R552	ERG3SJS181H	RES,M 180–J–3W CT–32S20U CT–35G21U CT–35G21UU CT–35G21CU
R554	ERG2ANJ390	RES,M 39–J–2W CT–32S20U CT–35G21U CT–35G21UU CT–35G21CU
R554	ERG3SJ470	RES,M 47–J–3W CT–35G31U CT–35G31UU
R555	ERDS2TJ5R6	RES,C 5.6–J–1/4 CT–35G31U CT–35G31UU
R556	ERDS2TJ202	RES,C 2K–J–1/4
R557	ERDS2TJ103	RES,C 10K–J–1/4
R558	ERQ2CJP2R0	RES,F 2.0–J–2W CT–35G21U CT–35G21UU CT–35G21CU CT–35G31U CT–35G31UU
R558	**ERQ2CJP2R4**	**RES,F 2.4–J–2W** **CT–32S20U**
R560	ERG2ANJP561H	RES,M 560–J–2W
R561	ERG2ANJP102H	RES,M 1K–J–2W
R563	ERDS2TJ223	RES,C 22K–J–1/4
R564	ERDS2TJ563	RES,C 56K–J–1/4
R565	ERDS2TJ472	RES,C 4.7K–J–1/4 CT–32S20U
R568	ERDS2TJ472	RES,C 4.7K–J–1/4 CT–35G21U CT–35G21UU CT–35G21CU CT–35G31U CT–35G31UU
R571	ERX1SJ1R0	RES,M 1.0–J–1W CT–32S20U CT–35G21U CT–35G21UU CT–35G21CU
R601	ERDS2TJ152	RES,C 1.5K–J–1/4
R602	ERDS2TJ392	RES,C 3.9K–J–1/4
R604	ERDS2TJ331	RES,C 330–J–1/4
R605	ERDS2TJ331	RES,C 330–J–1/4
R606	ERDS2TJ331	RES,C 330–J–1/4
R614	ERDS2TJ222	RES,C 2.2K–J–1/4
R615	ERDS2TJ222	RES,C 2.2K–J–1/4
R616	ERDS2TJ222	RES,C 2.2K–J–1/4
R617	ERDS2TJ222	RES,C 2.2K–J–1/4
R619	ERDS2TJ331	RES,C 330–J–1/4
R752	ERDS2TJ333	RES,C 33K–J–1/4 CT–32S20U
R752	ERDS2TJ473	RES,C 47K–J–1/4 CT–35G21U CT–35G21UU CT–35G21CU CT–35G31U CT–35G31UU
R753	ERDS2TJ103	RES,C 10K–J–1/4 CT–32S20U
R753	ERDS2TJ123	RES,C 12K–J–1/4 CT–35G21U CT–35G21UU CT–35G21CU CT–35G31U CT–35G31UU
R754	ERQ14AJ221	RES,F 220–J–1/4
R755	ERDS2TJ563	RES,C 56K–J–1/4
R756	ERDS2TJ103	RES,C 10K–J–1/4
R757	ERDS2TJ224	RES,C 220K–J–1/4
R758	ERDS2TJ273	RES,C 27K–J–1/4
R759	ERDS2TJ222	RES,C 2.2K–J–1/4
R760	EVND8AA03B53	CONTROL 5K
R761	EVND8AA03B14	CONTROL 10K
R762	ERDS2TJ182	RES,C 1.8K–J–1/4

REPLACEMENT PARTS LIST

(Models: CT–32S20U, CT–35G21U/UU/CU, and CT–35G31U/UU)

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF. NO.	PART NO.	DESCRIPTION
R763	ERDS2TJ183	RES,C 18K–J–1/4
R764	ERDS2TJ124	RES,C 120K–J–1/4
R765	ERDS2TJ272	RES,C 2.7K–J–1/4
R766	ERDS2TJ362	RES,C 3.6K–J–1/4
R767	ERDS2TJ222	RES,C 2.2K–J–1/4
R768	ERQ2CJP100	RES,F 10–J–2W
R801	**ERF7ZKR82**	**RES,W .82–K–7W**
R804	ERG2ANJ333	RES,M 33K–J–2W
R805	ERF2AKR22	RES,W .22–K–2W
R806	ERDS2TJ273	RES,C 27K–J–1/4
R807	ERDS1FJ132	RES,C 1.3K–J–1/2
R811	ERQ1CKPR33	RES,F .33–K–1W
R812	ERQ1CKR33	RES,F .33–K–1W
R814	ERDS2TJ185	RES,C 1.8MEG–J–1/4
R815	**ERC12ZGM825**	**RES,S 8.2MEG–M–1/2**
R816	ERDS2TJ105	RES,C 1MEG–J–1/4
R817	ERDS2TJ185	RES,C 1.8MEG–J–1/4
R818	ERDS1TJ101	RES,C 100–J–1/2 CT–35G21U CT–35G21UU CT–35G21CU
R818	ERDS2TJ101	RES,C 100–J–1/4 CT–32S20U CT–35G31U CT–35G31UU
R819	**ERDS1FJ1R0**	**RES,C 1.0–J–1/2**
R1023	ERDS2TJ102	RES,C 1K–J–1/4
R1024	ERDS2TJ103	RES,C 10K–J–1/4
R1025	ERDS2TJ103	RES,C 10K–J–1/4
R1029	ERDS2TJ102	RES,C 1K–J–1/4
R1030	ERDS2TJ473	RES,C 47K–J–1/4
R1051	ERDS2TJ102	RES,C 1K–J–1/4
R1801	ERJ6GEYJ101	RES,M 100–J–1/10
R1802	ERJ6GEYJ101	RES,M 100–J–1/10
R1803	ERJ6GEYJ103	RES,M 10K–J–1/10
R1804	ERJ6GEYJ562	RES,M 5.6K–J–1/10
R1805	ERJ6GEYJ562	RES,M 5.6K–J–1/10
R1806	ERJ6GEYJ750	RES,M 75–J–1/10
R1807	ERJ6GEYJ750	RES,M 75–J–1/10
R1811	ERJ6GEYJ103	RES,M 10K–J–1/10
R1812	ERJ6GEYJ103	RES,M 10K–J–1/10
R1813	ERJ6GEYJ103	RES,M 10K–J–1/10
R1814	EVND8AA03B23	CONTROL 2K
R1815	ERJ6GEYJ473	RES,M 47K–J–1/10
R1816	ERJ6GEYJ473	RES,M 47K–J–1/10
R1817	ERJ6GEYJ683	RES,M 68K–J–1/10
R1818	ERJ6GEYJ562	RES,M 5.6K–J–1/10
R1819	ERJ6GEYJ153	RES,M 15K–J–1/10
R1821	ERJ6GEYJ221	RES,M 220–J–1/10
R1822	ERJ6GEYJ221	RES,M 220–J–1/10
R1823	ERJ6GEYJ221	RES,M 220–J–1/10
R1824	ERJ6GEYJ221	RES,M 220–J–1/10
R1825	ERJ6GEYJ221	RES,M 220–J–1/10
R1826	ERJ6GEYJ221	RES,M 220–J–1/10
R1827	ERJ6GEYJ221	RES,M 220–J–1/10
R1828	ERJ6GEYJ221	RES,M 220–J–1/10
R1830	ERJ6GEYJ221	RES,M 220–J–1/10
R1831	ERJ6GEYJ221	RES,M 220–J–1/10
R1832	ERJ6GEYJ221	RES,M 220–J–1/10
R1833	ERJ6GEYJ221	RES,M 220–J–1/10
R2106	ERJ6GEYJ183	RES,M 18K–J–1/10 CT–35G31U CT–35G31UU
R2109	ERJ6GEYJ683	RES,M 68K–J–1/10 CT–35G31U CT–35G31UU
R2110	ERJ6GEYJ331	RES,M 330–J–1/10 CT–35G31U CT–35G31UU
R2111	ERJ6GEYJ152	RES,M 1.5K–J–1/10 CT–35G31U CT–35G31UU
R2112	ERJ6GEYJ331	RES,M 330–J–1/10 CT–35G31U CT–35G31UU
R2113	ERJ6GEYJ102	RES,M 1K–J–1/10 CT–35G31U CT–35G31UU
R2114	ERJ6GEYJ681	RES,M 680–J–1/10 CT–35G31U CT–35G31UU
R2116	ERJ6GEYJ102	RES,M 1K–J–1/10 CT–35G31U CT–35G31UU
R2117	ERJ6GEYJ121	RES,M 120–J–1/10 CT–35G31U CT–35G31UU
R2118	EVND8AA03B14	CONTROL 10K CT–35G31U CT–35G31UU
R2119	ERJ6GEYJ392	RES,M 3.9K–J–1/10 CT–35G31U CT–35G31UU
R2121	ERJ6GEYJ221	RES,M 220–J–1/10 CT–35G31U CT–35G31UU
R2122	ERJ6GEYJ473	RES,M 47K–J–1/10 CT–35G31U CT–35G31UU
R2123	ERJ6GEYJ473	RES,M 47K–J–1/10 CT–35G31U CT–35G31UU
R2124	ERJ6GEYJ332	RES,M 3.3K–J–1/10 CT–35G31U CT–35G31UU
R2127	ERJ6GEYJ101	RES,M 100–J–1/10 CT–35G31U CT–35G31UU
R2201	ERDS2TJ472	RES,C 4.7K–J–1/4
R2202	ERDS2TJ153	RES,C 15K–J–1/4
R2203	ERDS2TJ104	RES,C 100K–J–1/4
R2204	ERDS2TJ473	RES,C 47K–J–1/4
R2205	ERDS2TJ154	RES,C 150K–J–1/4
R2206	ERDS2TJ471	RES,C 470–J–1/4
R2207	ERDS2TJ471	RES,C 470–J–1/4
R2208	ER0S2CKF9102	RES,M 91K–F–1/4
R2212	ERDS2TJ682	RES,C 6.8K–J–1/4
R2220	ERDS2TJ682	RES,C 6.8K–J–1/4
R2221	ERDS2TJ472	RES,C 4.7K–J–1/4
R2301	ERDS2TJ102	RES,C 1K–J–1/4 CT–32S20U CT–35G21U CT–35G21UUCT–35G21CU
R2301	ERDS2TJ621	RES,C 820–J–1/4 CT–35G31U CT–35G31UU
R2302	ERDS2TJ102	RES,C 1K–J–1/4 CT–32S20U CT–35G21U CT–35G21UUCT–35G21CU
R2302	ERDS2TJ821	RES,C 820–J–1/4 CT–35G31U CT–35G31UU
R2303	ERDS2TJ912	RES,C 9.1K–J–1/4

REPLACEMENT PARTS LIST

(Models: CT-32S20U, CT-35G21U/UU/CU, and CT-35G31U/UU)

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF. NO.	PART NO.	DESCRIPTION
R2304	ERDS2TJ912	RES,C9.1K-J-1/4
R2305	ERD25FJ2R2	RES,C2.2-J-1/4
R2306	ERD25FJ2R2	RES,C2.2-J-1/4
R2307	ERDS2TJ392	RES,C3.9K-J-1/4
R2308	ERDS2TJ392	RES,C3.9K-J-1/4
R2310	ERDS2TJ103	RES,C10K-J-1/4
R2311	ERDS2TJ103	RES,C10K-J-1/4
R2312	ERJ6GEYJ104	RES,M100K-J-1/10 CT-35G31U CT-35G31UU
R2312	ERJ6GEYJ184	RES,M180K-J-1/10 CT-32S20U CT-35G21U CT-35G21UUCT-35G21CU
R2313	ERJ6GEYJ104	RES,M100K-J-1/10
R2315	ERDS2TJ682	RES,C6.8K-J-1/4
R2316	ERDS2TJ331	RES,C330-J-1/4
R2340	ERJ6GEYJ332	RES,M3.3K-J-1/10
R2342	ERJ6GEYJ333	RES,M33K-J-1/10
R2345	ERJ6GEYJ472	RES,M4.7K-J-1/10
R2346	ERJ6GEYJ332	RES,M3.3K-J-1/10
R2348	ERJ6GEYJ333	RES,M33K-J-1/10
R2349	ERJ6GEYJ472	RES,M4.7K-J-1/10
R2350	ERJ6GEYJ332	RES,M3.3K-J-1/10
R2351	ERJ6GEYJ222	RES,M2.2K-J-1/10
R2352	ERJ6GEYJ332	RES,M3.3K-J-1/10
R2353	ERJ6GEYJ222	RES,M2.2K-J-1/10
R2354	ERJ6GEYJ681	RES,M680-J-1/10
R2355	ERJ6GEYJ223	RES,M22K-J-1/10
R2356	ERJ6GEYJ223	RES,M22K-J-1/10
R2357	ERJ6GEYJ752	RES,M7.5K-J-1/10
R2358	ERJ6GEYJ273	RES,M27K-J-1/10
R2359	ERJ6GEYJ333	RES,M33K-J-1/10
R2360	ERJ6GEYJ153	RES,M15K-J-1/10
R2362	ERJ6GEYJ473	RES,M47K-J-1/10
R2363	ERJ6GEYJ473	RES,M47K-J-1/10
R2364	ERJ6GEYJ223	RES,M22K-J-1/10
R2365	ERJ6GEYJ103	RES,M10K-J-1/10
R2366	ERJ6GEYJ182	RES,M1.8K-J-1/10
R2401	ERJ6GEYJ392	RES,M3.9K-J-1/10
R2402	ERJ6GEYJ392	RES,M3.9K-J-1/10
R2403	ERJ6GEYJ103	RES,M10K-J-1/10 CT-35G31U CT-35G31UU
R2404	ERJ6GEYJ152	RES,M1.5K-J-1/10 CT-35G31U CT-35G31UU
R2405	ERJ6GEYJ824	RES,M820K-J-1/10 CT-35G31U CT-35G31UU
R2406	ERJ6GEYJ332	RES,M3.3K-J-1/10 CT-35G31U CT-35G31UU
R2407	ERJ6GEYJ103	RES,M10K-J-1/10 CT-35G31U CT-35G31UU
R2410	ERJ6GEYJ3R9	RES,M3.9K-J-1/10 CT-35G31U CT-35G31UU
R2411	ERJ6GEYJ103	RES,M10K-J-1/10
R2412	ERJ6GEYJ104	RES,M100K-J-1/10
R2414	ERJ6GEYJ223	RES,M22K-J-1/10 CT-35G31U CT-35G31UU
R2415	ERJ6GEYJ473	RES,M47K-J-1/10
R2416	ERJ6GEYJ104	RES,M100K-J-1/10
R2451	ERJ6GEYJ225	RES,M2.2MEG-J-1/10
R2455	ERJ6GEYJ243	RES,M24K-J-1/10
R2456	ERDS2TJ103	RES,C10K-J-1/4
R3001	ERJ6GEYJ102	RES,M1K-J-1/10
R3003	ERJ6GEYJ184	RES,M180K-J-1/10
R3004	ERJ6GEYJ184	RES,M180K-J-1/10
R3005	ERJ6GEYJ101	RES,M100-J-1/10
R3006	ERJ6GEYJ750	RES,M75-J-1/10
R3008	ERJ6GEYJ680	RES,M68-J-1/10
R3009	ERJ6GEYJ101	RES,M100-J-1/10
R3010	ERJ6GEYJ750	RES,M75-J-1/10
R3011	ERJ6GEYJ101	RES,M100-J-1/10
R3012	ERJ6GEYJ683	RES,M68K-J-1/10
R3014	ERJ6GEYJ103	RES,M10K-J-1/10
R3015	ERJ6GEYJ104	RES,M100K-J-1/10
R3016	ERJ6GEYJ221	RES,M220-J-1/10
R3017	ERJ6GEYJ102	RES,M1K-J-1/10
R3024	ERJ6GEYJ102	RES,M1K-J-1/10
R3025	ERJ6GEYJ470	RES,M47-J-1/10
R3031	ERJ6GEYJ101	RES,M100-J-1/10
R3032	ERJ6GEYJ750	RES,M75-J-1/10
R3033	ERJ6GEYJ184	RES,M180K-J-1/10
R3034	ERJ6GEYJ102	RES,M1K-J-1/10
R3035	ERJ6GEYJ184	RES,M180K-J-1/10
R3036	ERJ6GEYJ102	RES,M1K-J-1/10
R3037	ERJ6GEYJ683	RES,M68K-J-1/10
R3038	ERJ6GEYJ683	RES,M68K-J-1/10
R3071	ERJ6GEYJ223	RES,M22K-J-1/10
R3072	ERJ6GEYJ683	RES,M68K-J-1/10
R3073	ERJ6GEYJ683	RES,M68K-J-1/10
R3074	ERJ6GEYJ223	RES,M22K-J-1/10
R3075	ERJ6GEYJ102	RES,M1K-J-1/10
R3076	ERJ6GEYJ102	RES,M1K-J-1/10
R3077	ERJ6GEYJ152	RES,M1.5K-J-1/10
R3078	ERJ6GEYJ471	RES,M470-J-1/10
R3079	ERJ6GEYJ101	RES,M100-J-1/10
R3080	ERJ6GEYJ471	RES,M470-J-1/10
R3201	ERJ6GEYJ103	RES,M10K-J-1/10
R3202	ERJ6GEYJ223	RES,M22K-J-1/10
R3203	ERJ6GEYJ101	RES,M100-J-1/10
R3204	ERJ6GEYJ102	RES,M1K-J-1/10
R3205	ERJ6GEYJ272	RES,M2.7K-J-1/10
R3206	ERJ6GEYJ682	RES,M6.8K-J-1/10
R3207	ERJ6GEYJ103	RES,M10K-J-1/10
R3208	ERJ6GEYJ102	RES,M1K-J-1/10
R3209	ERJ6GEYJ102	RES,M1K-J-1/10
R3210	ERJ6GEYJ103	RES,M10K-J-1/10
R3211	ERJ6GEYJ181	RES,M180-J-1/10
R3212	ERJ6GEYJ331	RES,M330-J-1/10
R3213	ERJ6GEYJ102	RES,M1K-J-1/10
R3214	ERJ6GEYJ331	RES,M330-J-1/10
R3215	EVND8AA03B22	CONTROL 200 OHM
R3217	ERJ6GEYJ271	RES,M270-J-1/10
R3218	ERJ6GEYJ122	RES,M1.2K-J-1/10
R3220	ERJ6GEYJ331	RES,M330-J-1/10

REPLACEMENT PARTS LIST

(Models: CT-32S20U, CT-35G21U/UU/CU, and CT-35G31U/UU)

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF. NO.	PART NO.	DESCRIPTION
R3221	ERJ6GEYJ122	RES,M1.2K-J-1/10
R3222	ERJ6GEYJ471	RES,M470-J-1/10
R3223	ERJ6GEYJ471	RES,M470-J-1/10
R3224	ERJ6GEYJ471	RES,M470-J-1/10
R3227	ERJ6GEYJ332	RES,M3.3K-J-1/10
R3228	ERJ6GEYJ104	RES,M100K-J-1/10
R3229	ERJ6GEYJ152	RES,M1.5K-J-1/10
R3290	ERDS2TJ561	RES,C560-J-1/4 CT-35G21U CT-35G21UU CT-35G21CUCT-35G31U CT-35G31UU
R3291	ERDS2TJ182	RES,C1.8K-J-1/4 CT-35G21U CT-35G21UU CT-35G21CUCT-35G31U CT-35G31UU
R3293	ERDS2TJ391	RES,C390-J-1/4 CT-35G21U CT-35G21UU CT-35G21CUCT-35G31U CT-35G31UU
R3294	ERDS2TJ101	RES,C100-J-1/4 CT-35G21U CT-35G21UU CT-35G21CUCT-35G31U CT-35G31UU
R4356	ERJ6GEYJ681	RES,M680-J-1/10
R4358	ERJ6GEYJ102	RES,M1K-J-1/10
R4359	ERJ6GEYJ471	RES,M470-J-1/10
R4360	ERJ6GEYJ102	RES,M1K-J-1/10
R4361	ERJ6GEYJ560	RES,M56-J-1/10
R4362	ERJ6GEYJ561	RES,M560-J-1/10
R4363	ERJ6GEYJ471	RES,M470-J-1/10
R4364	ERJ6GEYJ102	RES,M1K-J-1/10
R4365	ERJ6GEYJ683	RES,M68K-J-1/10
R4367	ERJ6GEYJ331	RES,M330-J-1/10
R4368	ERJ6GEYJ510	RES,M51-J-1/10
R4369	ERJ6GEYJ105	RES,M1.0MEG-J-1/10
R4370	ERJ6GEYJ222	RES,M2.2K-J-1/10
R4371	ERJ6GEYJ102	RES,M1K-J-1/10
R4372	ERJ6GEYJ471	RES,M470-J-1/10
R4373	ERJ6GEYJ822	RES,M8.2K-J-1/10
R4374	ERJ6GEYJ273	RES,M27K-J-1/10
R4375	ERJ6GEYJ221	RES,M220-J-1/10
R4376	ERJ6GEYJ471	RES,M470-J-1/10
R4377	ERJ6GEYJ223	RES,M22K-J-1/10
R4378	ERJ6GEYJ562	RES,M5.6K-J-1/10
R4379	ERJ6GEYJ103	RES,M10K-J-1/10
R4380	ERJ6GEYJ683	RES,M68K-J-1/10
R4381	ERJ6GEYJ331	RES,M330-J-1/10
R4382	ERJ6GEYJ101	RES,M100-J-1/10
R4383	ERJ6GEYJ471	RES,M470-J-1/10
R4384	ERJ6GEYJ331	RES,M330-J-1/10
R4395	ERJ6GEYJ102	RES,M1K-J-1/10
R4396	ERJ6GEYJ471	RES,M470-J-1/10
R4397	ERJ6GEYJ393	RES,M39K-J-1/10
R4398	ERJ6GEYJ334	RES,M330K-J-1/10
R4399	ERJ6GEYJ272	RES,M2.7K-J-1/10
R4414	ERJ6GEYJ101	RES,M100-J-1/10
R4415	ERJ6GEYJ101	RES,M100-J-1/10
R4417	ERJ6GEYJ101	RES,M100-J-1/10
R4418	ERJ6GEYJ101	RES,M100-J-1/10
R4419	ERJ6GEYJ101	RES,M100-J-1/10 CT-35G31U CT-35G31UU
R4420	ERJ6GEYJ103	RES,M10K-J-1/10
R4421	ERJ6GEYJ103	RES,M10K-J-1/10
R4423	ERJ6GEYJ473	RES,M47K-J-1/10
R4424	ERJ6GEYJ473	RES,M47K-J-1/10
R4426	ERJ6GEYJ561	RES,M560-J-1/10
R4427	ERJ6GEYJ223	RES,M22K-J-1/10
R4428	ERJ6GEYJ222	RES,M2.2K-J-1/10
R4441	ERJ6GEYJ101	RES,M100-J-1/10
R4442	ERJ6GEYJ102	RES,M1K-J-1/10
		SWITCHES
S001	EVQQKH06K	POWER CT-32S20U
S002	EVQQKH06K	VOL DOWN CT-32S20U
S003	EVQQKH06K	VOL UP CT-32S20U
S004	EVQQKH06K	CH DOWN CT-32S20U
S005	EVQQKH06K	CH UP CT-32S20U
S006	EVQQKH06K	ACTION CT-32S20U
S007	EVQQKH06K	TV/VIDEO CT-32S20U
S010	EVQQVC13T	SWITCH CT-35G21U CT-35G21UU CT-35G21CUCT-35G31U CT-35G31UU
S011	EVQQVC13T	SWITCH CT-35G21U CT-35G21UU CT-35G21CUCT-35G31U CT-35G31UU
S012	EVQQVC13T	SWITCH CT-35G21U CT-35G21UU CT-35G21CUCT-35G31U CT-35G31UU
S013	EVQQVC13T	SWITCH CT-35G21U CT-35G21UU CT-35G21CUCT-35G31U CT-35G31UU
S014	EVQQVC13T	SWITCH CT-35G21U CT-35G21UU CT-35G21CUCT-35G31U CT-35G31UU
S015	EVQQVC13T	SWITCH CT-35G21U CT-35G21UU CT-35G21CUCT-35G31U CT-35G31UU
S016	EVQQVC13T	SWITCH CT-35G21U CT-35G21UU CT-35G21CUCT-35G31U

REPLACEMENT PARTS LIST

(Models: CT–32S20U, CT–35G21U/UU/CU, and CT–35G31U/UU)

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF. NO.	PART NO.	DESCRIPTION
		CT–35G31UU
		TRANSFORMERS
TNR001	**ENV568Q8G3**	**TUNER** **CT–35G21U CT–35G21UU** **CT–35G21CU CT–35G31U** **CT–35G31UU**
TNR001	**ENV568Q9G3**	**TUNER** **CT–32S20U**
TNR002	**ENV56D02G3**	**TUNER** **CT–35G31U CT–35G31UU**
T001	**TLP16297**	**TRANSFORMER, POWER SUPPLY**
T501	**TLH15452**	**TRANSFORMER, HORIZONTAL DRIVER**
T551	**KFT6AA022F**	**TRANSFORMER** **CT–35G21U CT–35G21UU** **CT–35G21CU CT–35G31U** **CT–35G31UU**
T551	**0LF04508F**	**TRANSFORMER, FLYBACK** **CT–32S20U**
T801	**ETS39AG115AC**	**TRANSFORMER, POWER**
		CRYSTALS/FILTERS
X001	TSS2080MX	CRYSTAL, 12 MHZ CLOCK
X101	EFCKM1963M	CERAMIC FILTER
X102	EFCWS4504AB	FILTER 4.5MHZ
X201	EFCS4R5MS4W	FILTER 4.5MHZ BANDPASS
X501	EF0A503KS41	CRYSTAL, 503KHZ OSCILLATOR
X601	TS816M32	CRYSTAL 3.58MHZ OSCILLATOR
X2102	EFCWS4504AB	FILTER 4.5MHZ CT–35G31U CT–35G31UU
X2103	EFCKM1958M	CERAMIC FILTER CT–35G31U CT–35G31UU
X4351	TSS2163–M	CRYSTAL, 14.3MHZ OSCILLATOR
		OTHERS
M001	**A89LFL50X**	**CRT 35"** **CT–35G21U CT–35G21UU** **CT–35G21CU CT–35G31U** **CT–35G31UU**
M002	ENPE620	ANTENNA UNIT CT–35G31U CT–35G31UU
M003	ETC39C6NA	YOKE, CONVERGENCE CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
M004	**M80JUA061X**	**CRT 32"** **CT–32S20U**
M005	TAS2A0002	SPEAKER, 8 OHM CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
M006	TAS2A9D07	SPEAKER 5" X 2.2" CT–32S20U
M007	TBM2A10111	BADGE, PANASONIC CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
M008	TBM2A10141	BADGE, PANASONIC

REF. NO.	PART NO.	DESCRIPTION
		CT–32S20U
M009	TBX2A50191G	ASSY. 7 PUSHBUTTON CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
M010	TBX2A50251G	BUTTON, 7 KEY CT–32S20U
JK351	**TJS1A5050**	**CRT SOCKET** **CT–32S20U**
JK351	**TJS2A5001**	**CRT SOCKET** **CT–35G21U CT–35G21UU** **CT–35G21CU CT–35G31U** **CT–35G31UU**
M011	TKN2A90011	SPEAKER GRILLE CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
M012	TKP2AA00501	BATTERY COVER, REMOTE
M013	TKP2A11221	PANEL, SMOKE CT–32S20U
M014	TKB2A28132	CABINET, WOOD TABLE CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
M015	TKU2A11902	COVER, CABINET BACK CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
M016	TLC2047–2	MAGNET,RINGS:PURITY & STATIC CONV. CT–32S20U
M017	TMK2A233	INSULATOR, INFRARED CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
M018	TMM2A14001	LED/INFRA–RED HOLDER CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
M019	TMM2A30701	WEDGE, YOKE
M020	TMW2A9142	BRACKET, REAR A/V CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
M021	TMW2A9151	BRKT., SPEAKER CT–32S20U
M022	TMW2A97121	STRAIN RELIEF: AC LINE CORD CT–32S20U
M023	TNQ2AE002	REMOTE CONTROL CT–32S20U
M024	TNQ2AE006	REMOTE CONTROL CT–35G31U CT–35G31UU
M025	TNQ2AE007	TRANSMITTER, REMOTE CONTR CT–35G21U CT–35G21UU CT–35G21CU
M026	TQB2AA0060	MANUAL, OWNER'S CT–32S20U

REPLACEMENT PARTS LIST

(Models: CT–32S20U, CT–35G21U/UU/CU, and CT–35G31U/UU)

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF. NO.	PART NO.	DESCRIPTION
M027	TQB2AA0073	MANUAL, OWNER'S CT–35G31U CT–35G31UU
M028	TQB2AA0074	MANUAL, OWNER'S CT–35G21U CT–35G21UU
M029	TQB2AA0075	MANUAL, OWNER'S CT–35G21CU
M030	**TSX2AA0011**	**LINE CORD 2CON–18AWG** **CT–32S20U**
M031	TXFKE0295SER	ASSY, ESCUTCHEON CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
M032	TXFKU4896SER	ASSY, CABINET BACK CT–32S20U
M033	TXFKY5996SER	ASSY, CABINET FRONT CT–32S20U
M034	TXF3A01AFR	ASSY., DAG GND CT–32S20U
M035	TXF3A025QA	ASSY, DAG GND CT–35G21U CT–35G21UU CT–35G21CUCT–35G31U CT–35G31UU
M036	0FMK014ZZ	CONVERGENCE CORRECTOR STRIP
JK3031	TJB18619	AV TERMINAL (2AV VAO)

DESCRIPTION OF ABBREVIATIONS GUIDE

RESISTOR			
TYPE		TOLERANCE	
C	Carbon	F	+/- 1%
F	Fuse	J	+/- 5%
M	Metal Oxide	K	+/- 10%
S	Solid	M	+/- 20%
W	Wire Wound	G	+/- 2%

RES, C 270-J-1/4

CAPACITOR			
TYPE		TOLERANCE	
C	Ceramic	C	+/-0.25pF
E	Electrolytic	D	+/-0.5pF
P	Polyester	F	+/-1pF
S	Styrol	J	+/-5%
T	Tantalum	K	+/-10%
		L	+/-15%
		M	+/-20%
		P	+100%-0%
		Z	+80%-20%

CAP, P .068UF-K-50V

SERVICEMAN MODE (ELECTRONIC CONTROL)
SERVICE ADJUSTMENT VALUES

Model ______________________ Ser # ____________ Date ____________

Note: Record the original settings PRIOR to modifying the registers.

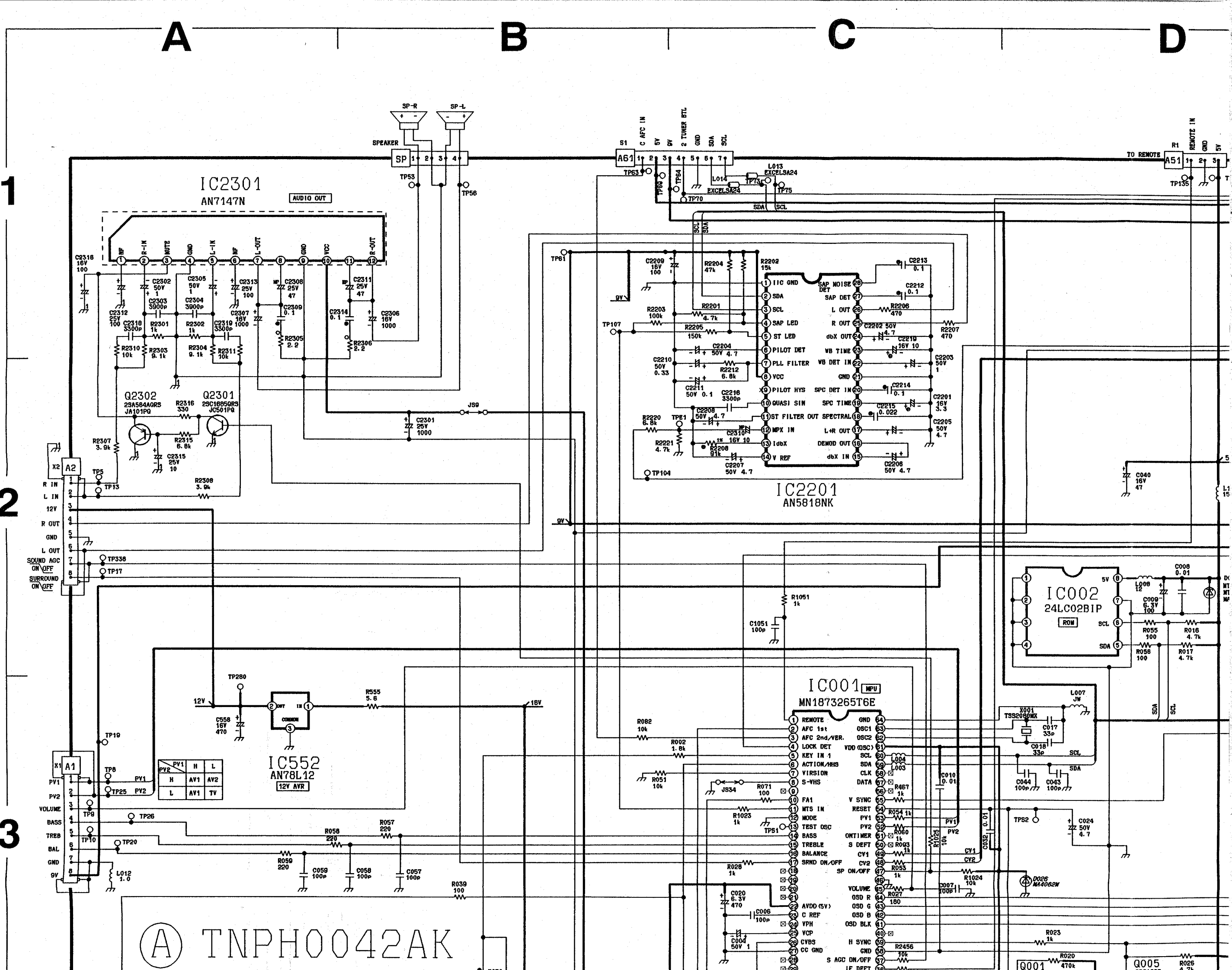
Mode	Service Adjustment	Adjustment Range	Def. Val.	Original Value	New Value
DAC Adjustments					
BO	Sub Bright	0 ~ 255	128		
B1	Sub Color	0 ~ 63	33		
B2	Sub Tint	0 ~ 63	33		
B3	Sub Contrast	0 ~ 63	34		
B4	Video Adjust.	0 ~ 15	8		
B5	Audio Adjust.	0 ~ 15	8		
CRT Adjustments					
C0	Horiz. Centering	0 ~ 15	8		
C1	RED Cutoff	0 ~ 255 *	128		
C2	GRN Cutoff	0 ~ 255 *	128		
C3	BLU Cutoff	0 ~ 255 *	128		
C4	RED Drive	0 ~ 255	128		
C5	BLU Drive	0 ~ 255	128		

* Adjustment indicated in 2 steps:
0 ~ 255 then 1 ~ 255

Mode	Service Adjustment	Adjustment Range	Def. Val.	Original Value	New Value
Options Adjustments					
S0	PIP Color	0 ~ 127	25		
S1	PIP Tint	0 ~ 127	55		
S2	PIP Sync.	0 ~ 7	4		
S3	Upper 1/9	0 ~ 255	229		
S4	Lower 1/9	0 ~ 255	111		
S5	Left 1/9	0 ~ 255	27		
S6	Right 1/9	0 ~ 255	123		
S7	Upper 1/16	0 ~ 255	229		
S8	Lower 1/16	0 ~ 255	93		
S9	Left 1/16	0 ~ 255	27		
Sa	Right 1/16	0 ~ 255	137		
Sb	Clock Adjust.	0 ~ 255	128		
MTS Adjustments					
M0	Input Level	0 ~ 63	31		
M1	Stereo PLL VCO	0 ~ 63	31		
M2	Filter	0 ~ 63	31		
M3	Low Level Separ.	0 ~ 63	31		
M4	High Level Separ.	0 ~ 63	31		

Printed in USA
96064300A0417

Panasonic 3234


A
B
C
D
1
2
3
IC2301
AN7147N
AUDIO OUT
Q2302
2SA564AQRS
JA101PQ
Q2301
2SC1685QRS
JC501PQ
SPEAKER
SP-R
SP-L
SP
TP53
TP56
J59
A2
X2
R IN
L IN
12V
R OUT
GND
L OUT
SOUND AGC ON/OFF
SURROUND ON/OFF
TP5
TP13
TP338
TP17
A1
X1
PV1
PV2
VOLUME
BASS
TREB
BAL
GND
9V
TP19
TP8
TP25
TP9
TP10
TP26
TP20
L012 1.0
IC552
AN78L12
12V AVR
TP280
R555 5.6
18V
A61
S1
C AFC IN
5V
5V
2 TUNER BTL
GND
SDA
SCL
TP63
TP64
TP70
TP73
TP75
L013 EXCEL SA24
L014 EXCEL SA24
TP61
TP107
TP104
IC2201
AN5818NK
IIC GND
SDA
SCL
SAP LED
ST LED
PILOT DET
PLL FILTER
VCC
PILOT HYS
QUASI SIN
ST FILTER OUT
MPX IN
IdbX
V REF
SAP NOISE DET
SAP DET
L OUT
R OUT
dbX OUT
WB TIME
WB DET IN
GND
SPC DET IN
SPC TIME
SPECTRAL
L+R OUT
DEMOD OUT
dbX IN
9V
A51
R1
TO REMOTE
REMOTE IN
GND
5V
TP135
IC002
24LC02BIP
ROM
5V
SCL
SDA
R055 100
R056 100
R016 4.7k
R017 4.7k
IC001
MPU
MN1873265T6E
REMOTE
AFC 1st
AFC 2nd/VER.
LOCK DET
KEY IN 1
ACTION/HHS
VIRSION
S-VHS
FA1
MTS IN
MODE
TEST OSC
BASS
TREBLE
BALANCE
SRND ON/OFF
AVDD (5V)
C REF
VPH
VCP
CVBS
CC GND
GND
OSC1
OSC2
VDD (OSC)
SCL
SDA
CLK
DATA
V SYNC
RESET
PV1
PV2
ONTIMER
S DEFT
CV1
CV2
SP ON/OFF
VOLUME
OSD R
OSD G
OSD B
OSD BLK
H SYNC
GND
S AGC ON/OFF
X001 TSS2080MX
L007 JW
D026 MA4062M
TPS1
TPS2
JS34
Q001
Q005
A
TNPH0042AK

6635A1

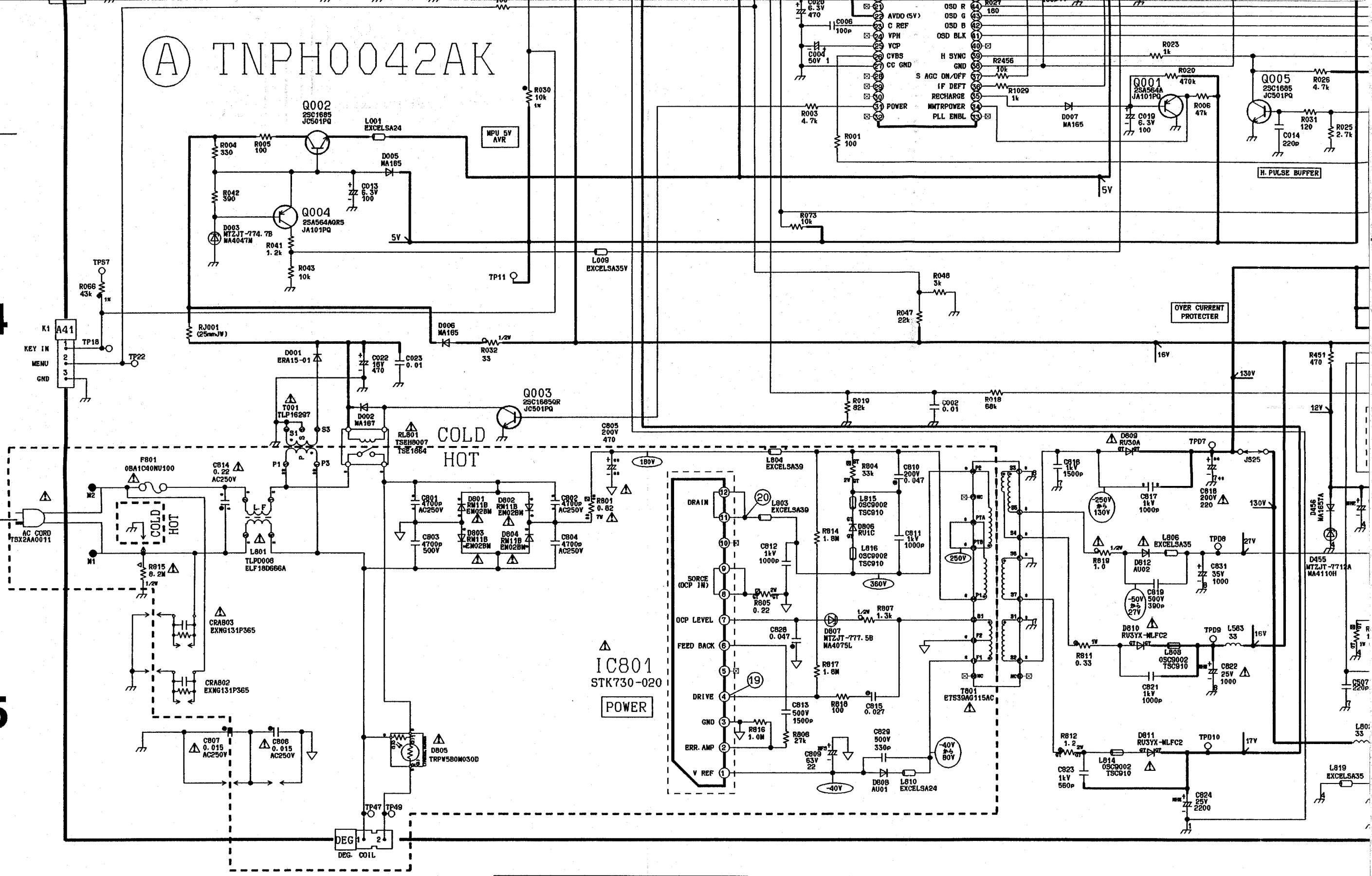
MTC960635A1

Sheet 1 of 4
Side A

A–Board Schematic
CT–35G31U/UU

4

5



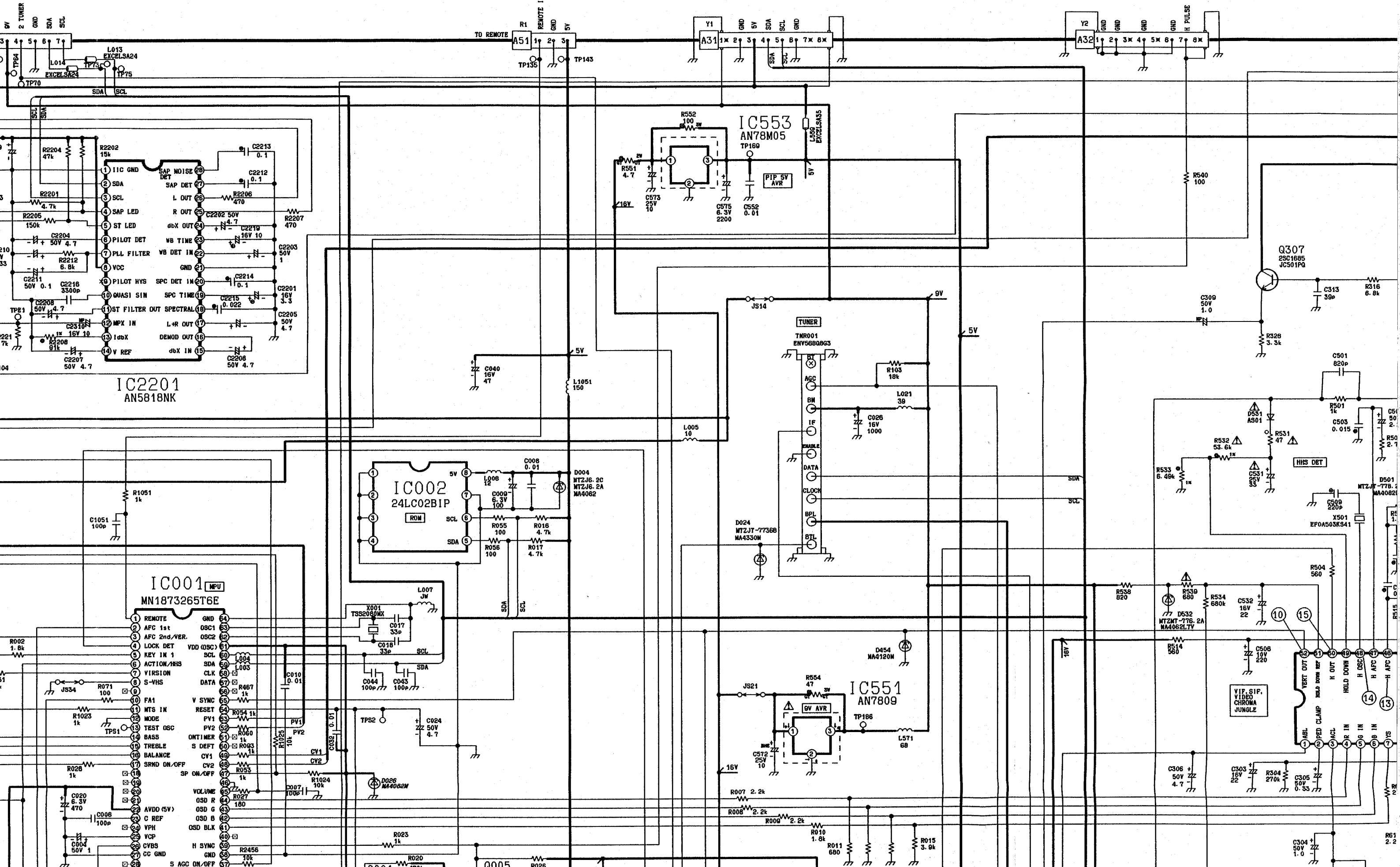
Ⓐ TNPH0042AK
Q002 2SC1685 JC501PQ
L001 EXCELSA24
R004 330
R005 100
D005 MA165
C013 6.3V 100
R042 390
Q004 2SA564AQRS JA101PQ
D003 MTZJT-774.7B MA4047M
R041 1.2k
R043 10k
5V
R030 10k
TP11
MPU 5V AVR
L009 EXCELSA35V
TP57
R066 43k
K1 A41
KEY IN
MENU
GND
TP18
TP22
RJ001 (25mmJW)
D006 MA165
R032 33
D001 ERA15-01
C022 16V 470
C023 0.01
T001 TLP16297
S1 S3 P1 P3
D002 MA167
Q003 2SC1685QR JC501PQ
RL801 TSEH8007 TSE1664
COLD
HOT
F801 0BA1C40NU100
C814 0.22 AC250V
AC CORD TSX2AA0011
R815 8.2M
L801 TLP0008 ELF18D666A
C801 4700p AC250V
C803 4700p 500V
D801 RM11B EM02BM
D802 RM11B EM02BM
D803 RM11B EM02BM
D804 RM11B EM02BM
C802 4700p AC250V
C804 4700p AC250V
CRA803 EXNG131P365
CRA802 EXNG131P365
C807 0.015 AC250V
C806 0.015 AC250V
D805 TRPW580M030D
TP47 TP49
DEG DEG. COIL
C805 200V 470
180V
R801 0.82
L804 EXCELSA39
IC801 STK730-020
POWER
DRAIN
SORCE (OCP IN)
OCP LEVEL
FEED BACK
DRIVE
GND
ERR. AMP
V REF
⑳ ⑲
L803 EXCELSA39
C812 1kV 1000p
R805 0.22
C828 0.047
R804 33k
L815 0SC9002 TSC910
D806 RU1C
L816 0SC9002 TSC910
R814 1.8M
C810 200V 0.047
C811 1kV 1000p
360V
D807 MTZJT-777.5B MA4075L
R807 1.3k
R817 1.8M
R818 100
C815 0.027
C813 500V 1500p
R816 1.0M
R806 27k
C809 63V 22
C829 500V 330p
D808 AU01
L810 EXCELSA24
-40V
-40V 80V
250V
T801 ETS39AG115AC
C816 1kV 1500p
D809 RU30A
-250V 130V
C817 1kV 1000p
C818 200V 220
TPD7
J525
130V
R819 1.0
D812 AU02
L806 EXCELSA35
TPD8
C831 35V 1000
-50V 27V
C819 500V 390p
D810 RU3YX-MLFC2
L808 0SC9002 TSC910
TPD9
L563 33
16V
R811 0.33
C821 1kV 1000p
C822 25V 1000
R812 1.2
C823 1kV 560p
L814 0SC9002 TSC910
D811 RU3YX-MLFC2
TPD10
17V
C824 25V 2200
L819 EXCELSA35
D456 MA1657A
D455 MTZJT-7712A MA4110H
21V
12V
R451 470
C507 220p
OVER CURRENT PROTECTER
R048 3k
R047 22k
16V
R019 82k
C002 0.01
R018 68k
R073 10k
R003 4.7k
R001 100
C020 6.3V 470
C006 100p
C004 50V 1
AVDD (5V)
C REF
VPH
VCP
CVBS
CC GND
POWER
OSD R
OSD G
OSD B
OSD BLK
H SYNC
GND
S AGC ON/OFF
IF DEFT
RECHARGE
MNTRPOWER
PLL ENBL
R027 180
R2456 10k
R1029 1k
D007 MA165
R023 1k
Q001 2SA564A JA101PQ
R020 470k
C019 6.3V 100
R006 47k
Q005 2SC1685 JC501PQ
R026 4.7k
R031 120
C014 220p
R025 2.7k
H.PULSE BUFFER
5V

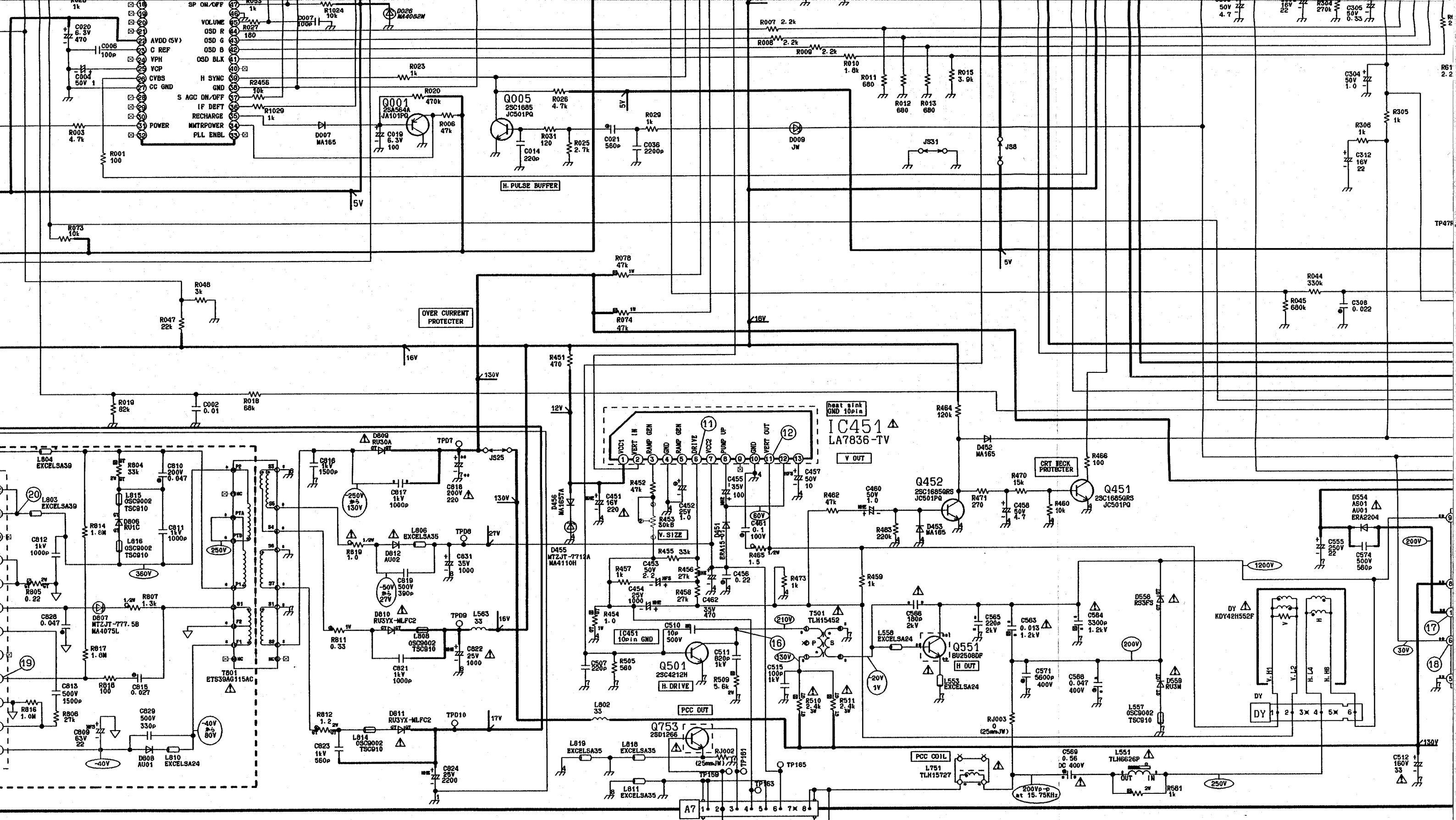
IMPORTANT SAFETY NOTICE

THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES THAT ARE IMPORTANT FOR PROTECTION FROM X-RADIATION, FIRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS DESIGNATED WITH A ⚠ IN THE SCHEMATIC.

C D E F

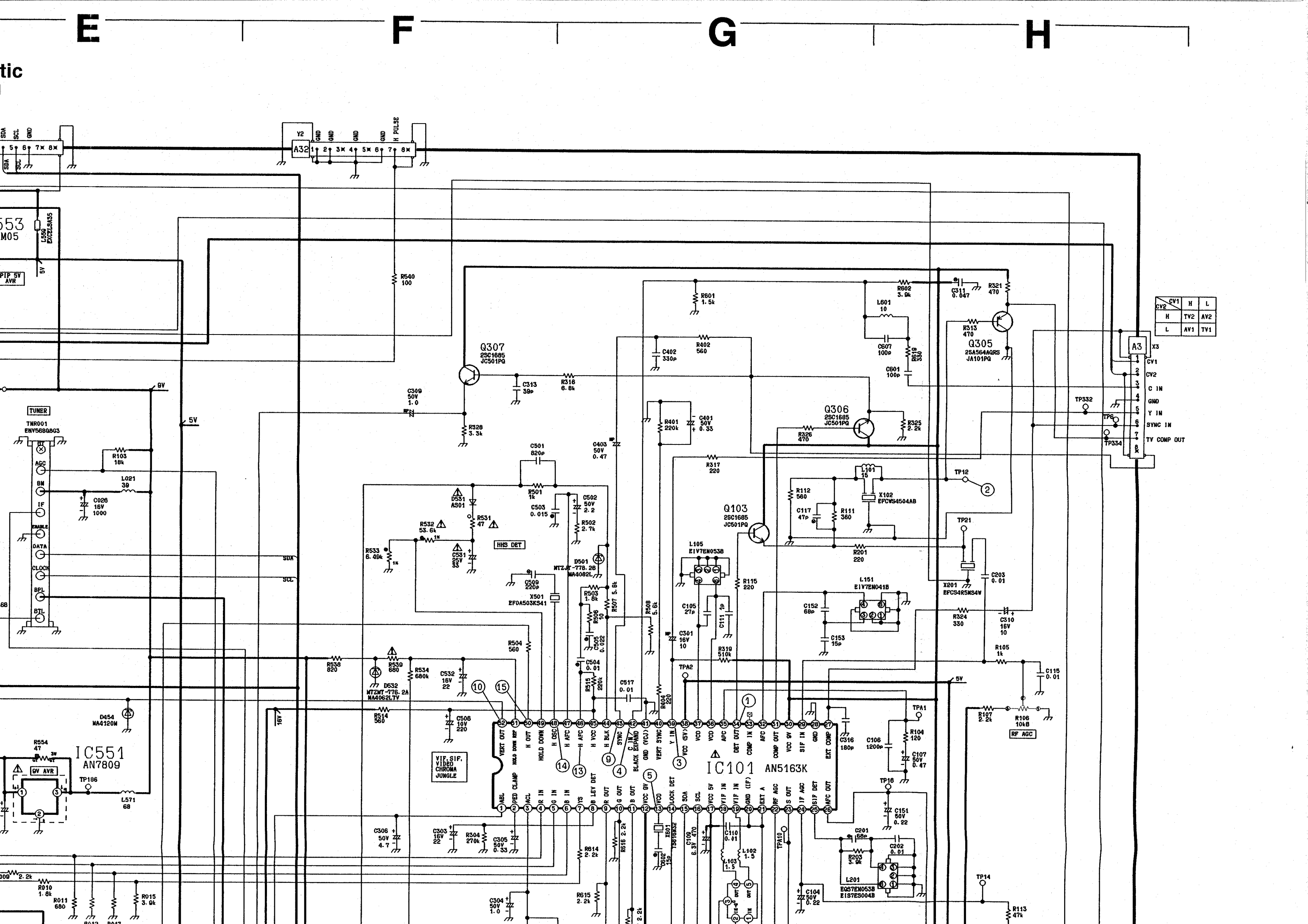
A–Board Schematic
CT–35G31U/UU

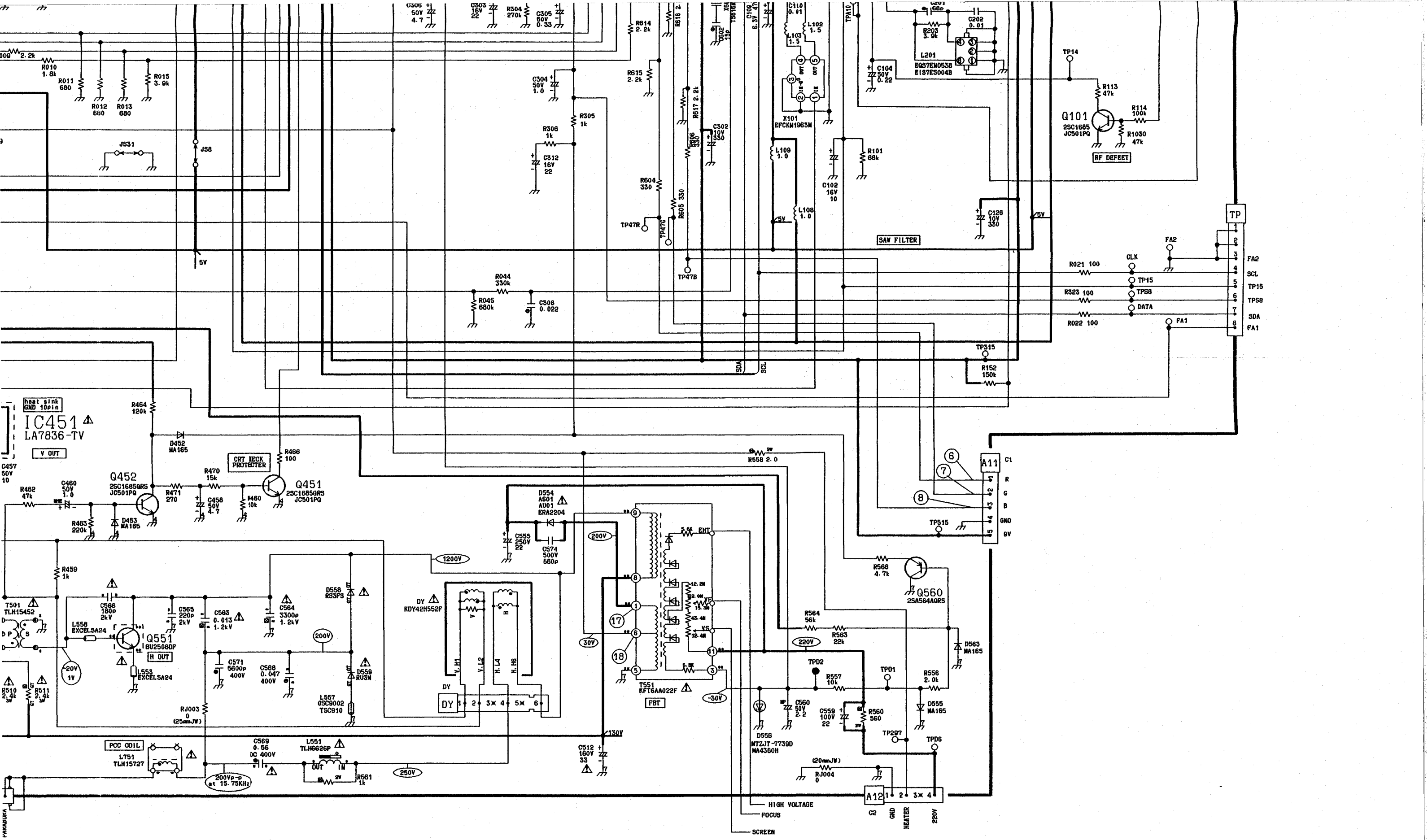

TUNER BTL
GND
SDA
SCL
TO REMOTE
R1
A51
REMOTE IN
GND
5V
TP135
TP143
Y1
A31
GND
5V
SDA
SCL
GND
Y2
A32
GND
GND
GND
GND
H PULSE
L013 EXCELSA24
L014 EXCELSA24
TP64
TP70
TP73
TP75
SDA
SCL
R2204 47k
R2202 15k
R2201 4.7k
R2205 150k
C2204 50V 4.7
R2212 6.8k
C2211 50V 0.1
C2216 3300p
C2208 50V 4.7
C2310 16V 10
R2208 91k
C2207 50V 4.7
TPE1
IIC GND
SDA
SCL
SAP LED
ST LED
PILOT DET
PLL FILTER
VCC
PILOT HYS
QUASI SIN
ST FILTER OUT
MPX IN
IdbX
V REF
SAP NOISE DET
SAP DET
L OUT
R OUT
dbX OUT
WB TIME
WB DET IN
GND
SPC DET IN
SPC TIME
SPECTRAL
L+R OUT
DEMOD OUT
dbX IN
C2213 0.1
C2212 0.1
R2206 470
C2202 50V 4.7
C2219 16V 10
R2207 470
C2203 50V 1
C2214 0.1
C2215 0.022
C2201 16V 3.3
C2205 50V 4.7
C2206 50V 4.7
IC2201
AN5818NK
R552 100
IC553
AN78M05
TP169
L559 EXCELSA35
R551 4.7
C573 25V 10
C575 6.3V 2200
C552 0.01
PIP 5V AVR
5V
16V
R540 100
Q307
2SC1685
JC501PQ
C313 39p
R316 6.8k
C309 50V 1.0
R328 3.3k
9V
JS14
TUNER
TNR001
ENV56808G3
BT
AGC
BN
IF
ENABLE
DATA
CLOCK
BPL
BTL
R103 18k
L021 39
C026 16V 1000
5V
C040 16V 47
L1051 150
L005 10
C501 820p
R501 1k
C503 0.015
D531 AS01
R531 47
R532 53.6k
R533 6.49k
C531 25V 33
HHS DET
D501 MTZJT-77
C509 220p
X501 EFOA503K541
IC002
24LC02BIP
ROM
5V
SCL
SDA
L006 12
C008 0.01
C009 6.3V 100
D004 MTZJ6.2C MTZJ6.2A MA4062
R055 100
R016 4.7k
R056 100
R017 4.7k
SDA
SCL
R1051 1k
C1051 100p
D024 MTZJT-7736B MA4330M
IC001 MPU
MN1873265T6E
REMOTE
AFC 1st
AFC 2nd/VER.
LOCK DET
KEY IN 1
ACTION/HHS
VIRSION
S-VHS
FA1
MTS IN
MODE
TEST OSC
BASS
TREBLE
BALANCE
SRND ON/OFF
AVDD (5V)
C REF
VPH
VCP
CVBS
CC GND
GND
OSC1
OSC2
VDD (OSC)
SCL
SDA
CLK
DATA
V SYNC
RESET
PV1
PV2
ONTIMER
S DEFT
CV1
CV2
SP ON/OFF
VOLUME
OSD R
OSD G
OSD B
OSD BLK
H SYNC
GND
S AGC ON/OFF
R002 1.8k
JS34
R071 100
R1023 1k
TPS1
R026 1k
C020 6.3V 470
C006 100p
C004 50V 1
X001 TSS2080MX
C017 33p
C018 33p
L007 JW
C044 100p
C043 100p
L004
L003
R467 1k
R054 1k
R060 1k
R093 1k
R053 1k
R027 180
R2456 10k
C010 0.01
R025 10k
C032 0.01
PV1
PV2
CV1
CV2
C007 100p
R1024 10k
TPS2
C024 50V 4.7
D026 MA4062N
R023 1k
R020
D454 MA4120M
JS21
R554 47
IC551
AN7809
9V AVR
TP186
C572 25V 10
L571 68
16V
R007 2.2k
R008 2.2k
R009 2.2k
R010 1.8k
R011 680
R015 3.9k
R538 820
R539 680
R534 680k
C532 16V 22
D532 MTZMT-776.2A MA4062LTV
R514 560
C506 10V 220
R504 560
VIF, SIF, VIDEO CHROMA JUNGLE
VERT OUT
HOLD DOWN REF
H OUT
HOLD DOWN
H OSC
H AFC
H AFC
ABL
PED CLAMP
ACL
R IN
G IN
B IN
YS
C306 50V 4.7
C303 16V 22
R304 270k
C305 50V 0.33
C304 50V 1.0

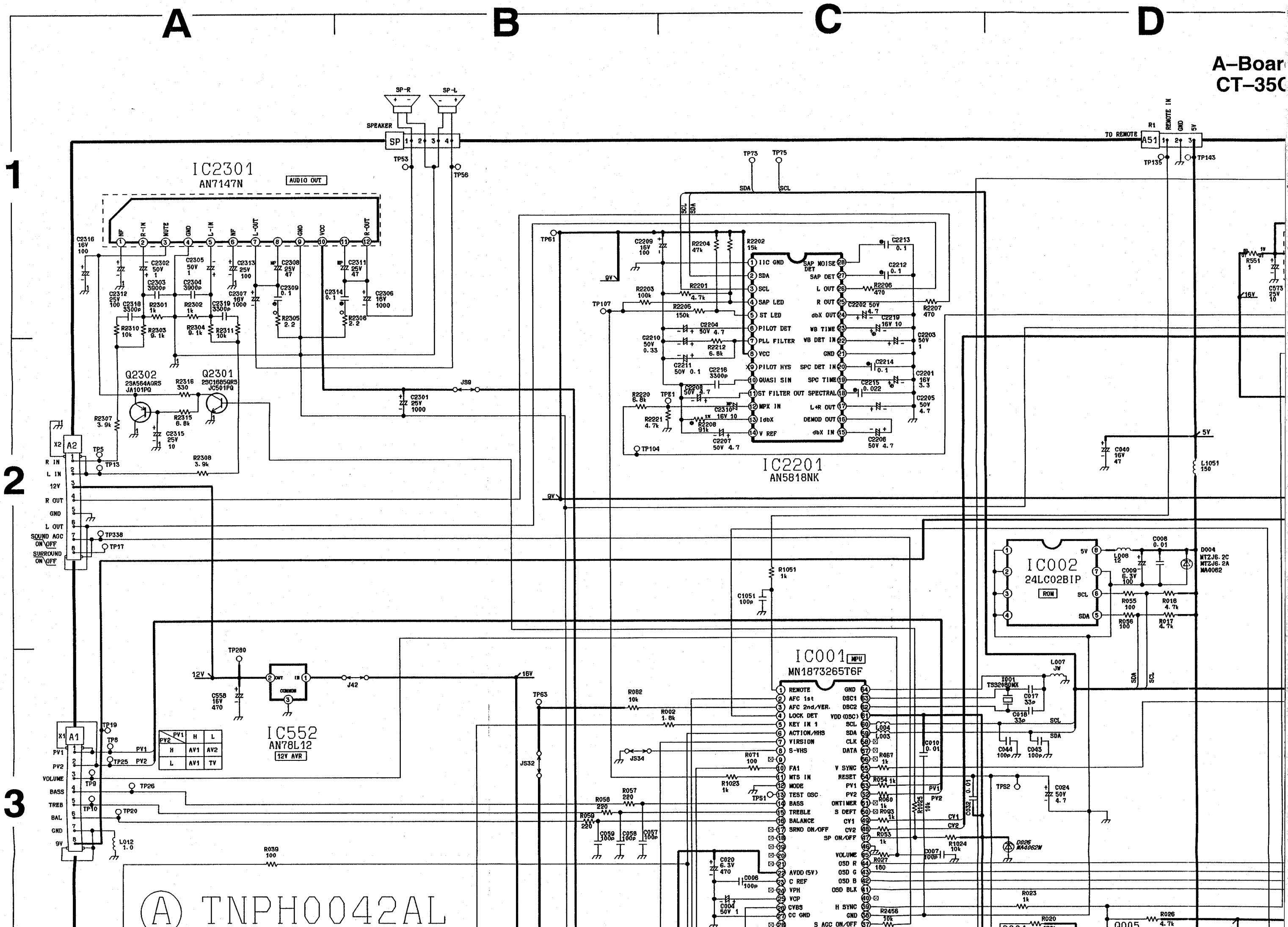

SP ON/OFF
VOLUME
OSD R
OSD G
OSD B
OSD BLK
H SYNC
GND
S AGC ON/OFF
IF DEFT
RECHARGE
MNTRPOWER
PLL ENBL
AVDD (5V)
C REF
VPH
VCP
CVBS
CC GND
POWER
C020 6.3V 470
C006 100p
C004 50V 1
R003 4.7k
R001 100
R1024 10k
R027 180
R2456 10k
R1029 1k
D007 MA165
D026 MA4062M
Q001 2SA564A JA101PQ
C019 6.3V 100
R020 470k
R006 47k
R023 1k
Q005 2SC1685 JC501PQ
R026 4.7k
R031 120
R025 2.7k
C014 220p
H. PULSE BUFFER
C021 560p
R029 1k
C036 2200p
D009 JW
JS31
JS8
R007 2.2k
R008 2.2k
R009 2.2k
R010 1.8k
R011 680
R012 680
R013 680
R015 3.9k
C304 50V 1.0
R305 1k
R306 1k
C312 16V 22
C305 50V 0.33
R304 270k
TP47R
5V
R073 10k
R078 47k
R074 47k
OVER CURRENT PROTECTER
R048 3k
R047 22k
16V
130V
R044 330k
R045 680k
C308 0.022
R019 82k
C002 0.01
R018 68k
R451 470
12V
D456 MA165TA
D455 MTZJT-7712A MA4110H
heat sink GND 10pin
IC451
LA7836-TV
V OUT
VCC1
VERT IN
RAMP GEN
GND
RAMP GEN
DRIVE
VCC2
PUMP UP
GND
VERT OUT
R464 120k
D452 MA165
CRT NECK PROTECTER
R466 100
Q452 2SC1685QRS JC501PQ
Q451 2SC1685QRS JC501PQ
R470 15k
R471 270
R460 10k
C458 50V 4.7
R462 47k
C460 50V 1.0
R463 220k
D453 MA165
C451 16V 220
R452 47k
R453 50kB
V. SIZE
C452 25V 1.0
C455 35V 100
C461 0.1 100V
C457 50V 10
60V
D451 ERA15-02
R465 1.5
R455 33k
R457 1k
C453 50V 2.2
R456 27k
R458 27k
C462 35V 470
C456 0.22
R473 1k
R459 1k
C454 25V 1000
R454 1.0
IC451 10pin GND
C510 10p 500V
Q501 2SC4212H
H. DRIVE
C507 220p
R505 560
C511 820p 1kV
R509 5.6k
C515 100p 1kV
R510 2.4k
R511 2.4k
PCC OUT
210V
130V
T501 TLH15452
-20V 1V
L558 EXCELSA24
C566 180p 2kV
Q551 BU2508DF
H OUT
L553 EXCELSA24
C565 220p 2kV
C563 0.013 1.2kV
C564 3300p 1.2kV
D558 RS3FS
C571 5600p 400V
C568 0.047 400V
200V
D559 RU3M
L557 0SC9002 TSC910
RJ003 0 (25mmJW)
D554 AS01 AU01 ERA2204
C555 250V 22
C574 500V 560p
1200V
200V
DY KDY42H552F
V.H1
V.L2
H.L4
H.H8
30V
C512 160V 33
250V
L551 TLH6626P
OUT IN
R561 1k
C569 0.56 DC 400V
200Vp-p at 15.75kHz
PCC COIL
L751 TLH15727
Q753 2SD1266
RJ002 (25mmJW)
TP161
TP165
TP159
TP163
L819 EXCELSA35
L818 EXCELSA35
L811 EXCELSA35
L802 33
A7
Z1
GND
VERT
GND
27V
PARABORA
L804 EXCELSA39
L803 EXCELSA39
R804 33k
C810 200V 0.047
L815 0SC9002 TSC910
D806 RU1C
L816 0SC9002 TSC910
C811 1kV 1000p
360V
R814 1.8M
C812 1kV 1000p
R805 0.22
D807 MTZJT-777.58 MA4075L
R807 1.3k
C828 0.047
R817 1.8M
R818 100
C815 0.027
C813 500V 1500p
R816 1.0M
R806 27k
C809 63V 22
C829 500V 330p
D808 AU01
L810 EXCELSA24
-40V
-40V 80V
250V
T801 ETS39AG115AC
D809 RU30A
TPD7
J525
C816 1kV 1500p
-250V 130V
C817 1kV 1000p
C818 200V 220
R819 1.0
D812 AU02
L806 EXCELSA35
TPD8
27V
C831 35V 1000
-50V 27V
C819 500V 390p
D810 RU3YX-MLFC2
L808 0SC9002 TSC910
TPD9
L563 33
R811 0.33
C822 25V 1000
C821 1kV 1000p
R812 1.2
L814 0SC9002 TSC910
D811 RU3YX-MLFC2
TPD10
17V
C823 1kV 560p
C824 25V 2200
⑪
⑫
⑯
⑰
⑱
⑲
⑳

CIAL
ROM
RDS
ONLY
THE
THE

tic

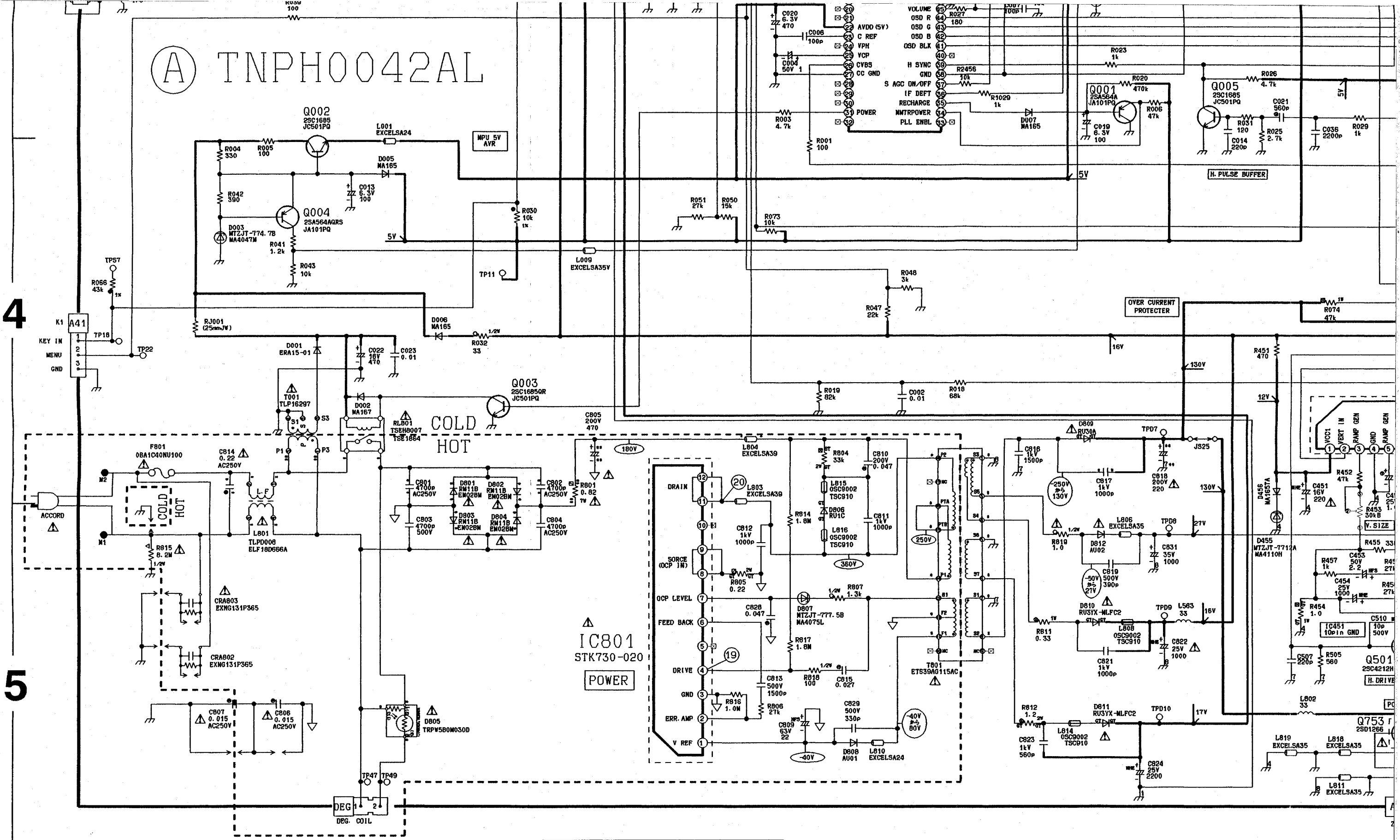

E
F
G
H
SDA
SCL
GND
Y2
A32
GND
GND
GND
GND
H PULSE
553
M05
L550
EXCELSA35
5V
PIP 5V
AVR
R540
100
9V
5V
TUNER
TNR001
ENV56808G3
RT
AGC
BM
IF
ENABLE
DATA
CLOCK
BPL
BTL
R103
18k
L021
39
C026
16V
1000
SDA
SCL
Q307
2SC1685
JC501PQ
C309
50V
1.0
C313
39p
R316
6.8k
R328
3.3k
C501
820p
R501
1k
C502
50V
2.2
C503
0.015
R502
2.7k
D531
AS01
R531
47
R532
53.6k
R533
6.49k
C531
25V
33
HHS DET
C509
220p
X501
EFOA503KS41
D501
MTZJT-77B.2B
MA4082L
R503
1.8k
R506
10
R507
5.6k
C505
0.022
C504
0.01
R515
220k
C517
0.01
R504
560
R538
820
R539
680
R534
680k
D532
MTZJT-77B.2A
MA4062LTV
C532
16V
22
R514
560
C508
10V
220
D454
MA4120M
R554
47
IC551
AN7809
9V AVR
TP186
L571
68
VIF,SIF,
VIDEO
CHROMA
JUNGLE
C306
50V
4.7
C303
16V
22
R504
270k
C305
50V
0.33
C304
50V
1.0
R614
2.2k
R615
2.2k
R616
2.2k
R010
1.8k
R011
680
R015
3.9k
R601
1.5k
R402
560
C402
330p
C403
50V
0.47
R401
220k
C401
50V
0.33
R508
5.6k
C301
16V
10
R404
220
R317
220
L105
EIV7EN0538
C105
27p
C111
1p
R115
220
R319
510k
TPA2
Q103
2SC1685
JC501PQ
R112
560
C117
47p
R111
360
L101
15
X102
EFCWS4504AB
R201
220
TP12
TP21
X201
EFCS4R5MS4W
C203
0.01
L151
EIV7EN0418
C152
68p
C153
15p
R324
330
C310
16V
10
R105
1k
C115
0.01
5V
R602
3.9k
C311
0.047
R321
470
L601
10
C607
100p
R619
330
C601
100p
R313
470
Q305
2SA564AQRS
JA101PQ
Q306
2SC1685
JC501PQ
R325
2.2k
R326
470
A3
X3
CV1
CV2
C IN
GND
Y IN
SYNC IN
TV COMP OUT
TP332
TP6
TP334
CV1
CV2
H
L
H
TV2
AV2
L
AV1
TV1
IC101
AN5163K
VERT OUT
HOLD DOWN REF
H OUT
HOLD DOWN
H OSC
H AFC
H AFC
H VCC
H BLK
SYNC
C IN EXPAND
BLACK EXPAND
GND (VCJ)
VERT SYNC
Y IN
VCC (5V)
VCO
VCO
APC
DET OUT
COMP IN
AFC
COMP OUT
VCC 9V
SIF IN
GND
EXT COMP
ABL
PED CLAMP
ACL
R IN
G IN
B IN
YS
B LEV DET
R OUT
G OUT
B OUT
VCC 9V
VCO
LOCK DET
SDA
SCL
VCC 5V
VIF IN
VIF IN
GND (IF)
EXT A
RF AGC
S OUT
IF AGC
SIF DET
AFC OUT
C316
180p
C106
1200p
R104
120
C107
50V
0.47
TPA1
R107
2.2k
R106
10kB
RF AGC
TP16
C151
50V
0.22
X601
TSS16K32
C602
15p
C109
6.3V
470
C110
0.01
L103
1.5
L102
1.5
TPA10
C201
68p
R203
3.9k
C202
0.01
L201
EQS7EN0538
EIS7ES004B
C104
50V
0.22
TP14
R113
47k
16V
① ② ③ ④ ⑤ ⑨ ⑩ ⑬ ⑭ ⑮


C306 50V 4.7
C303 16V 22
R304 270k
C305 50V 0.33
R814 2.2k
R616 2.2k
C602 15p
C109 6.3V 47
C110 0.01
L103 1.5
L102 1.5
TPA10
C201 68p
C202 0.01
R203 3.9k
L201 EQS7EN053B EIS7ES004B
C104 50V 0.22
TP14
R113 47k
Q101 2SC1685 JC501PQ
R114 100k
R1030 47k
RF DEFEET
R009 2.2k
R010 1.8k
R011 680
R012 680
R013 680
R015 3.9k
JS31
JS8
C304 50V 1.0
R305 1k
R306 1k
C312 16V 22
R615 2.2k
R617 2.2k
R606 330
C302 10V 330
X101 EFCKM1963M
L109 1.0
R101 68k
C102 16V 10
R604 330
R605 330
TP47R
TP47G
TP47B
L108 1.0
5V
C126 10V 330
SAW FILTER
TP
FA2
CLK
TP15
TPS8
DATA
FA1
R021 100
R323 100
R022 100
1 2 3 FA2 4 SCL 5 TP15 6 TPS8 7 SDA 8 FA1
R044 330k
R045 680k
C308 0.022
SDA
SCL
TP315
R152 150k
heat sink GND 10pin
IC451 LA7836-TV
V OUT
R464 120k
D452 MA165
CRT NECK PROTECTER
R466 100
R470 15k
Q451 2SC1685QRS JC501PQ
Q452 2SC1685QRS JC501PQ
R471 270
C458 50V 4.7
R460 10k
C457 50V 10
R462 47k
C460 50V 1.0
R463 220k
D453 MA165
D554 AS01 AU01 ERA2204
C555 250V 22
C574 500V 560p
200V
R558 2.0
A11 C1
⑥ ⑦ ⑧
1 R 2 G 3 B 4 GND 5 9V
TP515
R568 4.7k
Q560 2SA564AQRS
1200V
R459 1k
T501 TLN15452
C566 180p 2kV
L556 EXCELSA24
Q551 BU2508DF
H OUT
L553 EXCELSA24
C565 220p 2kV
C563 0.013 1.2kV
C564 3300p 1.2kV
D558 RU3FS
DY KDY42H552F
V.H1 V.L2 H.L4 H.H6
DY 1 2 3× 4 5× 6
200V
C571 5600p 400V
C588 0.047 400V
D559 RU3M
L557 OSC9002 TSC910
-20V 1V
R510 2.4k 3W
R511 2.4k 3W
RJ003 0 (25mmJW)
9 8 1 ⑰ 6 ⑱ 5 11 3
30V
EHT
VF
VS
5.6K
42.2M
43.4M
T551 KFT6AA022F
FBT
-30V
R564 56k
R563 22k
220V
D563 MA165
TPD2
R557 10k
TPD1
R556 2.0k
C560 50V 2.2
C559 100V 22
R560 560
D555 MA165
D556 MTZJT-7739D MA4380H
TP297
TPD6
130V
C512 160V 33
PCC COIL
L751 TLN15727
C569 0.56 400V
L551 TLH6626P
OUT IN
R561 1k
200Vp-p at 15.75KHz
250V
(20mmJW) RJ004 0
A12 C2 1 GND 2 HEATER 3× 4 220V
HIGH VOLTAGE
FOCUS
SCREEN



A–Boar
CT–35C

A
B
C
D
1
2
3
SP-R
SP-L
SPEAKER
SP
TP53
TP56
IC2301
AN7147N
AUDIO OUT
NF
R-IN
MUTE
GND
L-IN
NF
L-OUT
GND
VCC
R-OUT
C2316 16V 100
C2302 50V 1
C2305 50V 1
C2313 25V 100
C2308 25V 47
C2311 25V 47
C2303 3900p
C2304 3900p
C2307 16V 1000
C2309 0.1
C2314 0.1
C2306 16V 1000
C2312 25V 100
C2318 3300p
R2301 1k
R2302 1k
C2319 3300p
R2305 2.2
R2306 2.2
R2310 10k
R2303 9.1k
R2304 9.1k
R2311 10k
Q2302
2SA564AQRS
JA101PQ
Q2301
2SC1685QRS
JC501PQ
R2316 330
R2315 6.8k
R2307 3.9k
C2315 25V 10
C2301 25V 1000
JS9
R2308 3.9k
X2
A2
TP5
TP13
R IN
L IN
12V
R OUT
GND
L OUT
SOUND AGC ON/OFF
SURROUND ON/OFF
TP338
TP17
TP73
TP75
SDA
SCL
TP61
9V
C2209 16V 100
R2204 47k
R2202 15k
C2213 0.1
C2212 0.1
IC2201
AN5818NK
IIC GND
SDA
SCL
SAP LED
ST LED
PILOT DET
PLL FILTER
VCC
PILOT HYS
QUASI SIN
ST FILTER OUT
MPX IN
IdbX
V REF
SAP NOISE DET
SAP DET
L OUT
R OUT
dbX OUT
WB TIME
WB DET IN
GND
SPC DET IN
SPC TIME
SPECTRAL
L+R OUT
DEMOD OUT
dbX IN
R2203 100k
R2201 4.7k
R2206 470
R2205 150k
C2202 50V 4.7
C2219 16V 10
R2207 470
TP107
C2204 50V 4.7
C2210 50V 0.33
R2212 6.8k
C2203 50V 1
C2211 50V 0.1
C2216 3300p
C2214 0.1
C2201 16V 3.3
C2208 50V 4.7
C2215 0.022
R2220 6.8k
TPE1
C2310 16V 10
C2205 50V 4.7
R2221 4.7k
R2208 91k
C2207 50V 4.7
C2206 50V 4.7
TP104
TO REMOTE
A51
R1
REMOTE IN
GND
5V
TP135
TP143
R551 1
C573 25V 10
16V
5V
C040 16V 47
L1051 150
9V
IC002
24LC02BIP
ROM
5V
SCL
SDA
L008 12
C008 0.01
C009 6.3V 100
D004 MTZJ6.2C MTZJ6.2A MA4062
R055 100
R018 4.7k
R056 100
R017 4.7k
R1051 1k
C1051 100p
IC001
MPU
MN1873265T6F
REMOTE
AFC 1st
AFC 2nd/VER.
LOCK DET
KEY IN 1
ACTION/HHS
VIRSION
S-VHS
FA1
MTS IN
MODE
TEST OSC
BASS
TREBLE
BALANCE
SRND ON/OFF
SP ON/OFF
AVDD (5V)
C REF
VPH
VCP
CVBS
CC GND
GND
OSC1
OSC2
VDD (OSC)
SCL
SDA
CLK
DATA
V SYNC
RESET
PV1
PV2
ONTIMER
S DEFT
CV1
CV2
VOLUME
OSD R
OSD G
OSD B
OSD BLK
H SYNC
GND
S AGC ON/OFF
L007 JW
X001 TS3206DNX
C017 33p
C018 33p
L004
L003
C010 0.01
R467 1k
R054 1k
R060 1k
R063 1k
R053 1k
R1024 10k
R027 180
C007 100p
R023 1k
R2456 10k
R020
R026 4.7k
Q005
C044 100p
C043 100p
TPS2
C024 50V 4.7
D026 MA4062M
R1023
C032
PV1
PV2
CV1
CV2
TP280
12V
16V
C558 16V 470
IC552
AN78L12
12V AVR
COMMON
OUT
IN
J42
TP63
R082 10k
R002 1.8k
JS34
J532
R071 100
R1023 1k
TP51
R058 220
R057 220
R059 220
C059 100p
C058 100p
C057 100p
C020 6.3V 470
C006 100p
C004 50V 1
R039 100
X1
A1
TP19
TP8
TP25
TP9
TP10
TP26
TP20
PV1
PV2
VOLUME
BASS
TREB
BAL
GND
9V
L012 1.0
PV2
PV1
H
L
AV1
AV2
TV
A
TNPH0042AL

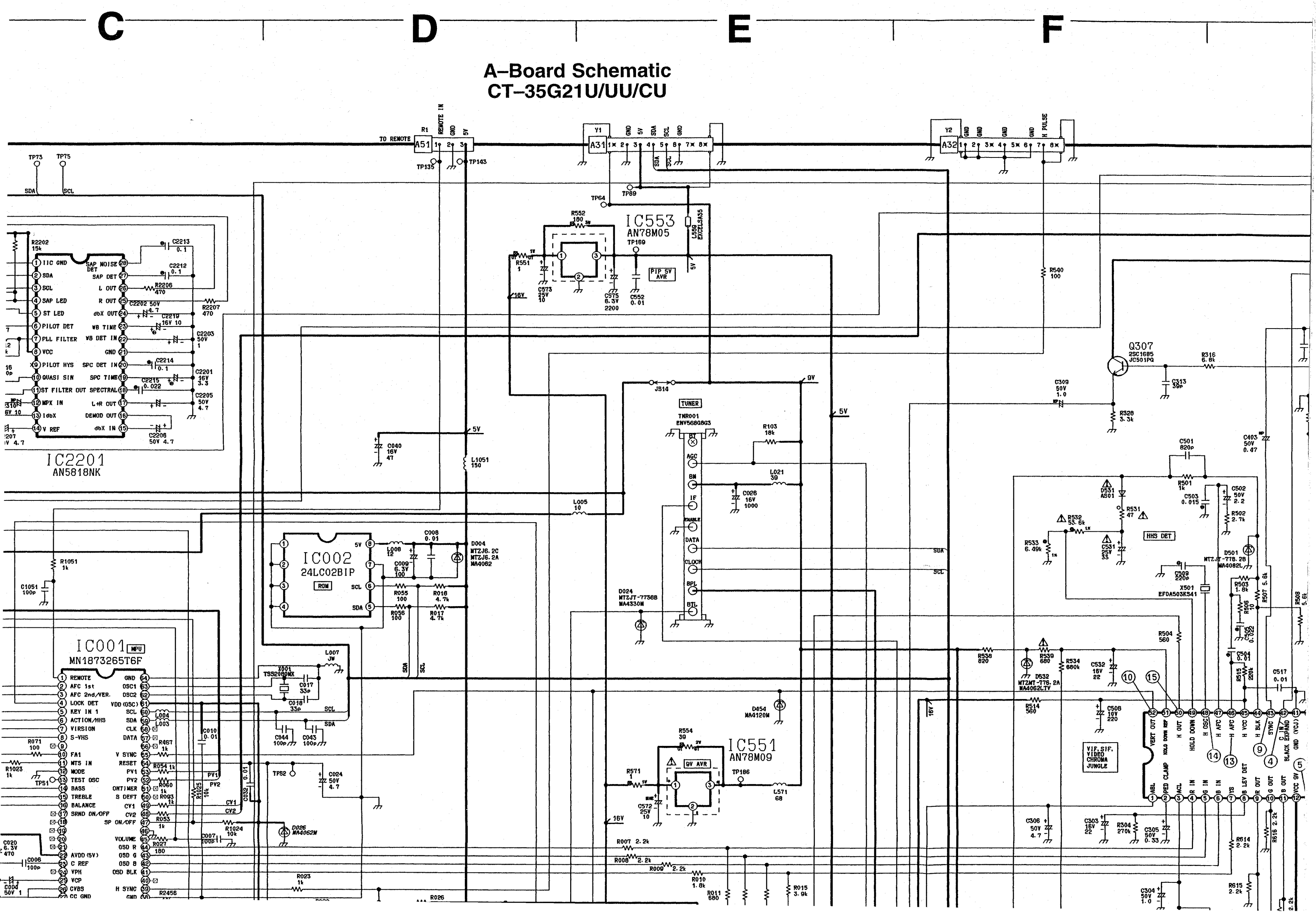


Ⓐ TNPH0042AL
4
5
Q002
2SC1685
JC501PQ
L001
EXCELSA24
MPU 5V AVR
R004 330
R005 100
D005 MA165
C013 6.3V 100
R042 390
Q004
2SA564AQRS
JA101PQ
D003
MTZJT-774.7B
MA4047M
R041 1.2k
R043 10k
5V
R030 10k
TP11
TPS7
R066 43k
K1 A41
KEY IN
MENU
GND
TP16
TP22
RJ001 (25mmJV)
D006 MA165
R032 33
D001 ERA15-01
C022 16V 470
C023 0.01
T001 TLP16297
D002 MA167
RL801 TSEH6007 TSE1664
Q003
2SC1685QR
JC501PQ
COLD
HOT
F801
08A1C40NU100
C814 0.22 AC250V
L.F
L801
TLPD008
ELF18D666A
ACCORD
R815 8.2M
CRA803
EXNG131P365
CRA802
EXNG131P365
C807 0.015 AC250V
C806 0.015 AC250V
C801 4700p AC250V
C803 4700p 500V
D801 RM11B EM02BM
D802 RM11B EM02BM
D803 RM11B EM02BM
D804 RM11B EM02BM
C802 4700p AC250V
C804 4700p AC250V
R801 0.82 7W
C805 200V 470
180V
D805 TRPW5B0M030D
TP47
TP49
DEG
DEG. COIL
L009 EXCELSA35V
IC801
STK730-020
POWER
DRAIN
SORCE (OCP IN)
OCP LEVEL
FEED BACK
DRIVE
GND
ERR. AMP
V REF
L804 EXCELSA39
L803 EXCELSA39
C812 1kV 1000p
R805 0.22
C828 0.047
D807 MTZJT-777.5B MA4075L
R807 1.3k
R814 1.8M
R817 1.8M
R818 100
C815 0.027
C813 500V 1500p
R806 27k
R816 1.0M
C809 63V 22
C829 500V 330p
D808 AU01
L810 EXCELSA24
-40V
-40V 80V
R804 33k
C810 200V 0.047
L815 0SC9002 TSC910
D806 RU1C
L816 0SC9002 TSC910
C811 1kV 1000p
360V
250V
T801 ETS39AG115AC
D809 RU30A
TPD7
JS25
C816 1kV 1500p
-250V 130V
C817 1kV 1000p
C818 200V 220
130V
R819 1.0
D812 AU02
L806 EXCELSA35
TPD8
27V
C831 35V 1000
-50V 27V
C819 500V 390p
D810 RU3YX-MLFC2
R811 0.33
L808 0SC9002 TSC910
TPD9
L563 33
16V
C821 1kV 1000p
C822 25V 1000
R812 1.2
L814 0SC9002 TSC910
D811 RU3YX-MLFC2
TPD10
17V
C823 1kV 560p
C824 25V 2200
C020 6.3V 470
C006 100p
C004 50V 1
AVDD (5V)
C REF
VPH
VCP
CVBS
CC GND
POWER
VOLUME
OSD R
OSD G
OSD B
OSD BLK
H SYNC
GND
S AGC ON/OFF
IF DEFT
RECHARGE
MWTRPOWER
PLL ENBL
R027 180
R2456 10k
R1029 1k
D007 MA165
R003 4.7k
R001 100
R023 1k
Q001
2SA564A
JA101PQ
R020 470k
R006 47k
C019 6.3V 100
Q005
2SC1685
JC501PQ
R026 4.7k
R031 120
C014 220p
R025 2.7k
C021 560p
C036 2200p
R029 1k
H. PULSE BUFFER
5V
R051 27k
R050 15k
R073 10k
R048 3k
R047 22k
16V
R019 82k
C002 0.01
R018 68k
OVER CURRENT PROTECTER
R074 47k
R451 470
130V
12V
VCC1
VERT IN
RAMP GEN
GND
D456 MA165TA
D455 MTZJT-7712A MA4110H
C451 16V 220
R452 47k
R453 50kB
V.SIZE
R455 33
R457 1k
C453 50V 2.2
C454 25V 1000
R454 1.0
IC451 10pin GND
C510 10p 500V
C507 220p
R505 560
Q501
2SC4212H
H.DRIVE
L802 33
Q753
2SD1266
L819 EXCELSA35
L818 EXCELSA35
L811 EXCELSA35

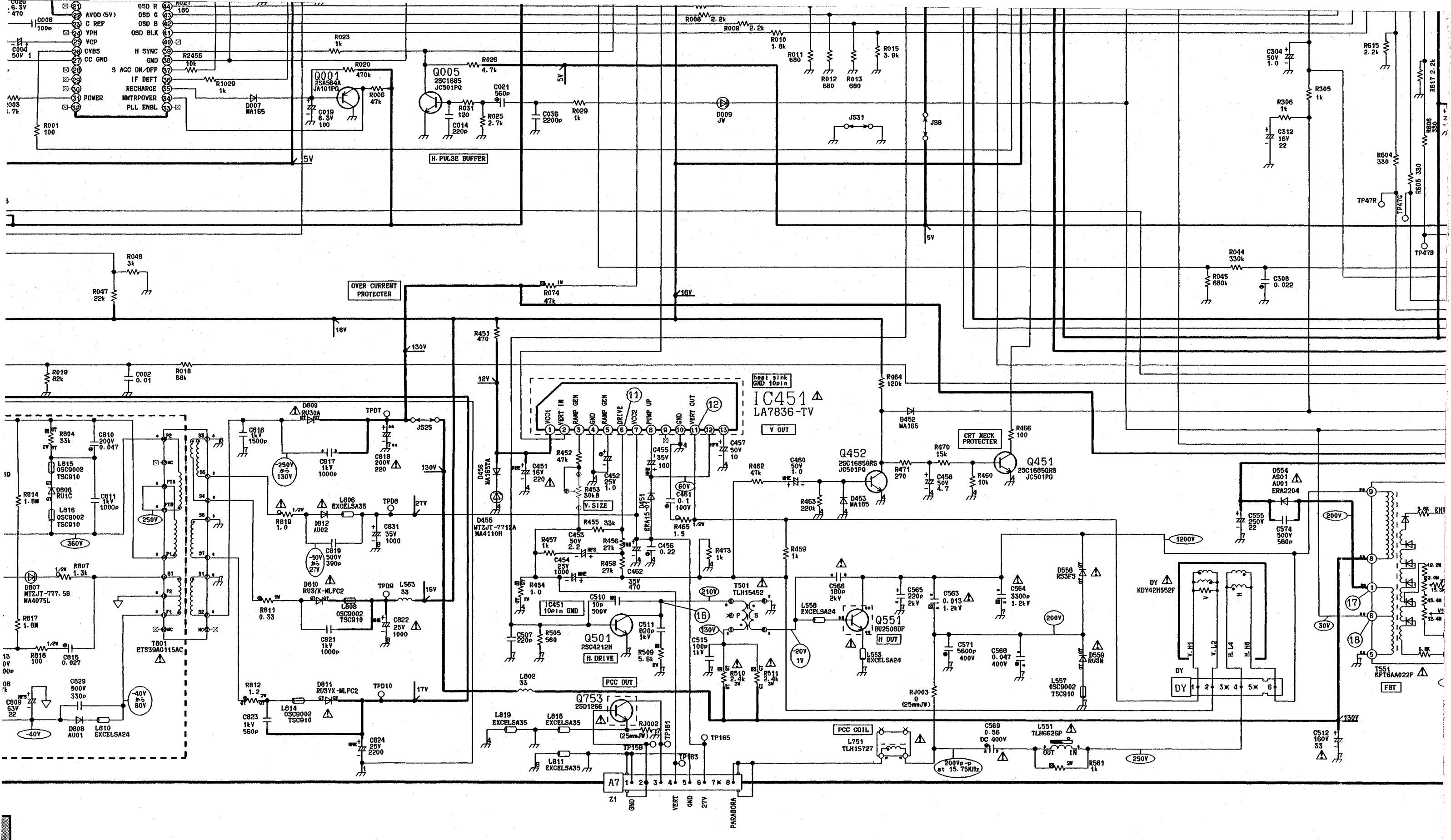
IMPORTANT SAFETY NOTICE

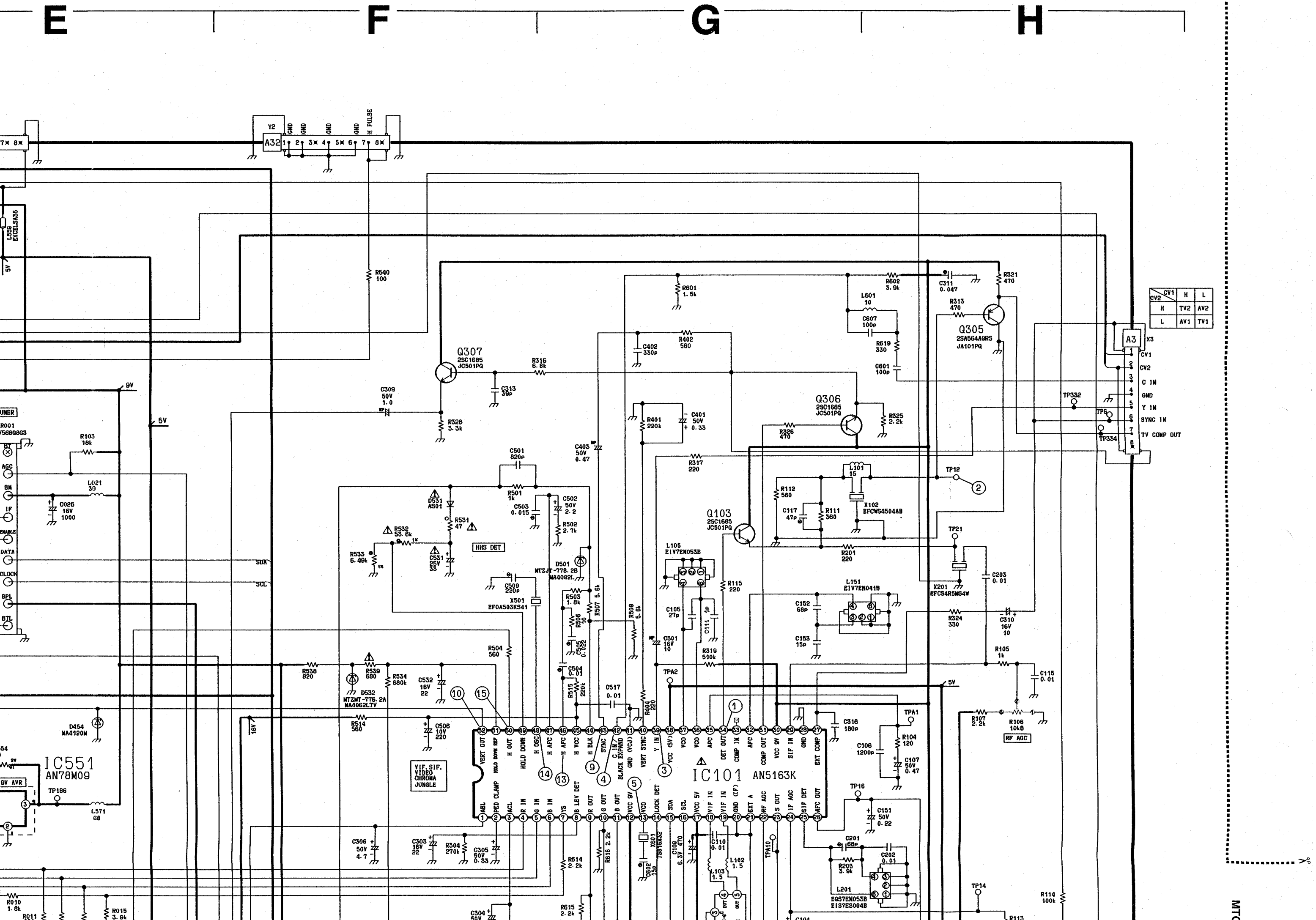
THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES THAT ARE IMPORTANT FOR PROTECTION FROM X-RADIATION, FIRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS DESIGNATED WITH A ⚠ IN THE SCHEMATIC.

A–Board Schematic
CT–35G21U/UU/CU

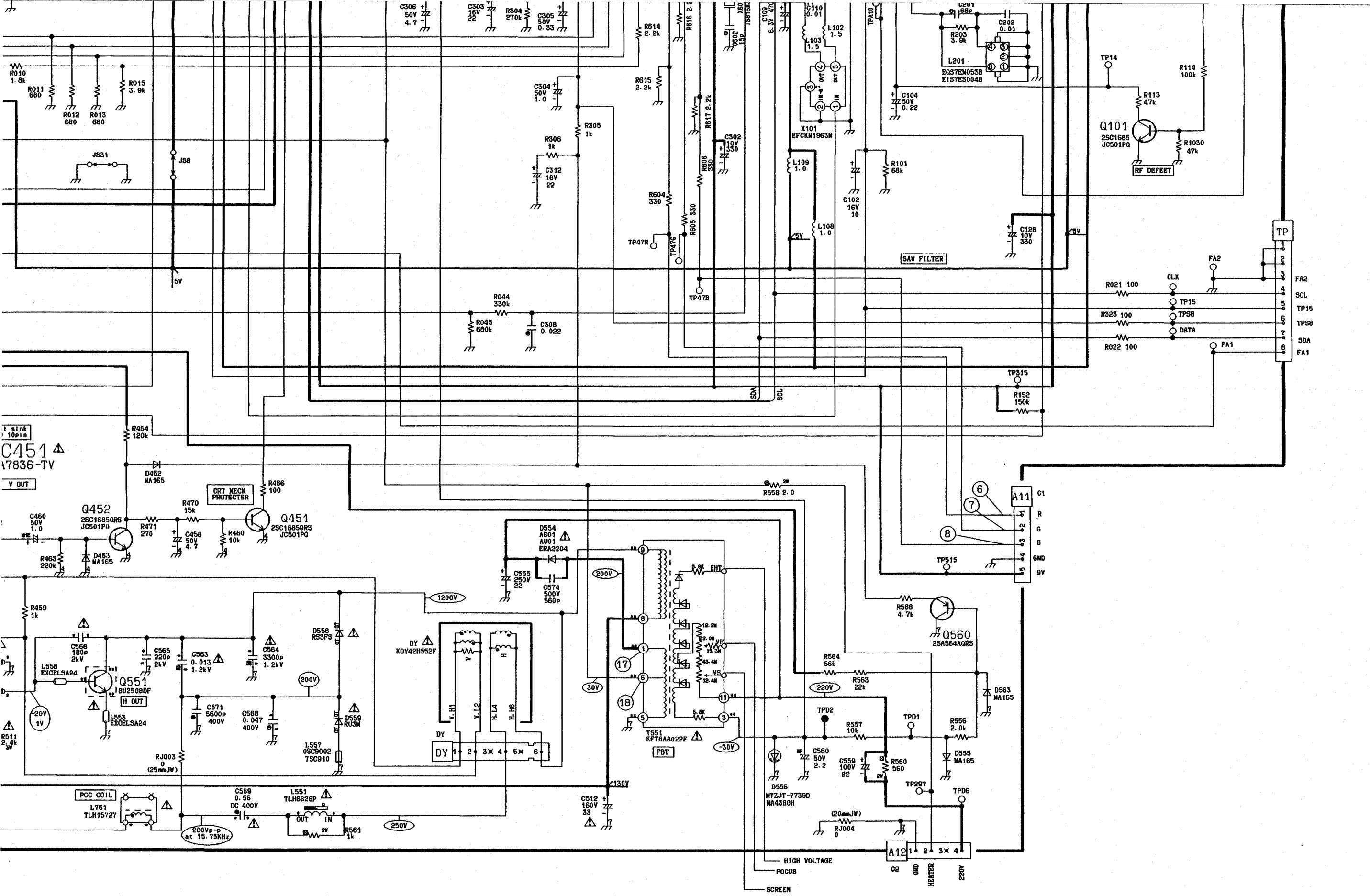


C
D
E
F
TO REMOTE
R1
REMOTE IN
GND
5V
A51
TP135
TP143
Y1
A31
SDA
SCL
Y2
A32
H PULSE
TP73
TP75
TP64
TP89
IC553
AN78M05
TP169
PIP 5V AVR
L550 EXCELSA35
R552 180
R551 1
C573 25V 10
C575 6.3V 2200
C552 0.01
16V
9V
5V
JS14
TUNER
TNR001
ENV56808G3
AGC
BM
IF
ENABLE
DATA
CLOCK
BPL
BTL
R103 18k
L021 39
C026 16V 1000
L005 10
IC2201
AN5818NK
IIC GND
SAP NOISE DET
SAP DET
L OUT
R OUT
dbX OUT
WB TIME
WB DET IN
GND
SPC DET IN
SPC TIME
ST FILTER OUT SPECTRAL
L+R OUT
DEMOD OUT
dbX IN
SAP LED
ST LED
PILOT DET
PLL FILTER
VCC
PILOT HYS
QUASI SIN
MPX IN
Idbx
V REF
R2202 15k
C2213 0.1
C2212 0.1
R2206 470
R2207 470
C2202 50V 4.7
C2219 16V 10
C2203 50V 1
C2214 0.1
C2215 0.022
C2201 16V 3.3
C2205 50V 4.7
C2206 50V 4.7
C040 16V 47
L1051 150
IC002
24LC02BIP
ROM
L008 12
C008 0.01
C009 6.3V 100
D004 MTZJ6.2C MTZJ6.2A MA4062
R055 100
R056 100
R016 4.7k
R017 4.7k
R1051 1k
C1051 100p
IC001
MPU
MN1873265T6F
REMOTE
AFC 1st
AFC 2nd/VER.
LOCK DET
KEY IN 1
ACTION/HHS
VIRSION
S-VHS
FA1
MTS IN
MODE
TEST OSC
BASS
TREBLE
BALANCE
SRND ON/OFF
AVDD (5V)
C REF
VPH
VCP
CVBS
CC GND
GND
OSC1
OSC2
VDD (OSC)
SCL
SDA
CLK
DATA
V SYNC
RESET
PV1
PV2
ONTIMER
S DEFT
CV1
CV2
SP ON/OFF
VOLUME
OSD R
OSD G
OSD B
OSD BLK
H SYNC
X001 TSS2080MX
L007 JW
C017 33p
C018 33p
C044 100p
C043 100p
C010 0.01
C032
TP52
C024 50V 4.7
D026 MA4062M
R1024 10k
C007 100p
R027 180
R053 1k
R2456
R071 100
R1023 1k
TP51
C020 6.3V 470
C006 100p
C004 50V 1
D024 MTZJT-7736B MA4330M
D454 MA4120M
IC551
AN78M09
9V AVR
R554 39
R571 1
C572 25V 10
TP186
L571 68
R007 2.2k
R008 2.2k
R009 2.2k
R010 1.8k
R011 680
R015 3.9k
R023 1k
R026
Q307
2SC1685 JC501PQ
R316 6.8k
C313 39p
C309 50V 1.0
R328 3.3k
R540 100
C501 820p
R501 1k
C503 0.015
C502 50V 2.2
R502 2.7k
D531 AS01
R531 47
R532 53.6k
R533 6.49k
C531 25V 33
HHS DET
C509 220p
X501 EFOA503KS41
D501 MTZJT-778.2B MA4082L
R503 1.8k
R506 10
R507 5.6k
R508 5.6k
R504 560
C505 0.022
C504 0.01
R515 220k
C517 0.01
C403 50V 0.47
R538 820
R539 680
R534 680k
D532 MTZMT-776.2A MA4062LTV
C532 16V 22
R514 560
C508 10V 220
VIF, SIF, VIDEO CHROMA JUNGLE
VERT OUT
HOLD DOWN REF
H OUT
HOLD DOWN
H OSC
H AFC
H VCC
H BLK
SYNC
C IN BLACK EXPAND
GND (VCJ)
ABL
PED CLAMP
ACL
R IN
G IN
B IN
YS
B LEV DET
R OUT
G OUT
B OUT
VCC 9V
C306 50V 4.7
C303 16V 22
R304 270k
C305 50V 0.33
R614 2.2k
R616 2.2k
R615 2.2k
C304 50V 1.0


AVDD (5V)
C REF
VPH
VCP
CVBS
CC GND
POWER
OSD R
OSD G
OSD B
OSD BLK
H SYNC
GND
S AGC ON/OFF
IF DEFT
RECHARGE
MNTRPOWER
PLL ENBL
C006 100p
C004 50V 1
R001 100
R027 180
R023 1k
R2456 10k
R1029 1k
D007 MA165
Q001 2SA564A JA101PQ
R020 470k
R006 47k
C019 6.3V 100
Q005 2SC1685 JC501PQ
R026 4.7k
R031 120
C014 220p
R025 2.7k
C021 560p
C036 2200p
R029 1k
H. PULSE BUFFER
5V
D009 JW
R008 2.2k
R009 2.2k
R010 1.8k
R011 680
R012 680
R013 680
R015 3.9k
JS31
JS8
C304 50V 1.0
R305 1k
R306 1k
C312 16V 22
R615 2.2k
R617 2.2k
R606 330
R604 330
R605 330
TP47R
TP47G
TP47B
R048 3k
R047 22k
16V
OVER CURRENT PROTECTER
R074 47k
R044 330k
R045 680k
C308 0.022
130V
R019 82k
C002 0.01
R018 68k
R451 470
12V
heat sink GND 10pin
IC451 LA7836-TV
V OUT
VCC1
VERT IN
RAMP GEN
GND
RAMP GEN
DRIVE
VCC2
PUMP UP
GND
VERT OUT
⑪
⑫
R464 120k
D452 MA165
R466 100
CRT NECK PROTECTER
Q452 2SC1685QRS JC501PQ
Q451 2SC1685QRS JC501PQ
R470 15k
R471 270
C458 50V 4.7
R460 10k
R462 47k
C460 50V 1.0
R463 220k
D453 MA165
R804 33k
C810 200V 0.047
L815 OSC9002 TSC910
D806 RU1C
L816 OSC9002 TSC910
C811 1kV 1000p
R814 1.8M
360V
250V
D807 MTZJT-777.5B MA4075L
R807 1.3k
R817 1.8M
R818 100
C815 0.027
C809 63V 22
C829 500V 330p
D808 AU01
L810 EXCELSA24
-40V
-40V から 80V
T801 ETS39AG115AC
C816 1kV 1500p
D809 RU30A
TPD7
JS25
C817 1kV 1000p
C818 200V 220
-250V から 130V
R819 1.0
D812 AU02
L806 EXCELSA35
TPD8
27V
C831 35V 1000
C819 500V 390p
-50V から 27V
R811 0.33
D810 RU3YX-MLFC2
L808 OSC9002 TSC910
TPD9
L563 33
C822 25V 1000
C821 1kV 1000p
R812 1.2
C823 1kV 560p
L814 OSC9002 TSC910
D811 RU3YX-MLFC2
TPD10
17V
C824 25V 2200
D456 MA165TA
D455 MTZJT-7712A MA4110H
C451 16V 220
R452 47k
R453 50kB
V. SIZE
C452 25V 1.0
C455 35V 100
C457 50V 10
ERA15-02V1
60V
C461 0.1 100V
R465 1.5
R455 33k
R457 1k
C453 50V 2.2
R456 27k
C456 0.22
C454 25V 1000
R458 27k
C462 35V 470
R454 1.0
IC451 10pin GND
C510 10p 500V
Q501 2SC4212H
H. DRIVE
C507 220p
R505 560
C511 820p 1kV
R509 5.6k
L802 33
PCC OUT
Q753 2SD1266
RJ002 (25mmJW)
L819 EXCELSA35
L818 EXCELSA35
L811 EXCELSA35
TP161
TP159
TP163
TP165
R473 1k
R459 1k
210V
T501 TLH15452
⑯
130V
C515 100p 1kV
R510 2.4k
R511 2.4k
-20V 1V
C566 180p 2kV
L558 EXCELSA24
Q551 BU2508DF
H OUT
L553 EXCELSA24
C565 220p 2kV
C563 0.013 1.2kV
C564 3300p 1.2kV
C571 5600p 400V
C568 0.047 400V
RJ003 0 (25mmJW)
200V
D556 RG3F3
D559 RU3M
L557 OSC9002 TSC910
1200V
DY KDY42H552F
V. H1
V. L2
H. L4
H. H6
DY
D554 AS01 AU01 ERA2204
C555 250V 22
C574 500V 560p
200V
30V
⑰
⑱
T551 KFT6AA022F
FBT
C512 160V 33
130V
PCC COIL
L751 TLH15727
C569 0.56 DC 400V
200Vp-p at 15.75KHz
L551 TLH6626P
OUT
IN
R561 1k
250V
A7
Z1
GND
VERT
GND
27V
PARABORA


E
F
G
H
Y2
A32
GND
GND
GND
GND
H PULSE
R540 100
Q307 2SC1685 JC501PQ
R316 6.8k
C313 39p
C309 50V 1.0
R328 3.3k
C501 820p
R501 1k
C503 0.015
C502 50V 2.2
R502 2.7k
D531 AS01
R531 47
R532 53.6k
R533 6.49k
C531 25V 33
HHS DET
D501 MTZJT-778.2B MA4082L
C509 220p
X501 EFOA503KS41
R503 1.8k
R506 10
R507 5.6k
C505 0.022
C504 0.01
R515 220k
C517 0.01
R504 560
R538 820
R539 680
D532 MTZWT-776.2A MA4062LTV
R534 680k
C532 16V 22
R514 560
C506 10V 220
C403 50V 0.47
C402 330p
R402 560
R401 220k
C401 50V 0.33
R508 5.6k
C301 16V 10
R404 220
R601 1.5k
R317 220
R602 3.9k
C311 0.047
R321 470
R313 470
Q305 2SA564AQRS JA101PQ
L601 10
C607 100p
R619 330
C601 100p
Q306 2SC1685 JC501PQ
R326 470
R325 2.2k
L101 15
R112 560
C117 47p
R111 360
X102 EFCWS4504AB
TP12
Q103 2SC1685 JC501PQ
TP21
R201 220
L105 E1V7EN053B
R115 220
C105 27p
1p
C111
R319 510k
L151 E1V7EN041B
C152 68p
C153 15p
X201 EFCS4R5MS4W
C203 0.01
R324 330
C310 16V 10
R105 1k
C115 0.01
TPA2
5V
R107 2.2k
R106 10kB
RF AGC
C316 180p
TPA1
R104 120
C106 1200p
C107 50V 0.47
TP16
C151 50V 0.22
C201 68p
R203 3.9k
C202 0.01
L201 EQS7EN053B EIS7ES004B
TP14
R114 100k
R113
TP332
TP6
TP334
A3
X3
CV1
CV2
C IN
GND
Y IN
SYNC IN
TV COMP OUT
IC101 AN5163K
VERT OUT
HOLD DOWN REF
H OUT
HOLD DOWN
H OSC
H AFC
H AFC
H VCC
H BLK
SYNC
C IN / BLACK EXPAND
GND (VCJ)
VERT SYNC
Y IN
VCC (5V)
VCO
VCO
APC
DET OUT
COMP IN
AFC
COMP OUT
VCC 9V
SIF IN
GND
EXT COMP
ABL
PED CLAMP
ACL
R IN
G IN
B IN
YS
B LEV DET
R OUT
G OUT
B OUT
VCC 9V
VCO
LOCK DET
SDA
SCL
VCC 5V
VIF IN
VIF IN
GND (IF)
EXT A
RF AGC
S OUT
IF AGC
SIF DET
AFC OUT
VIF, SIF, VIDEO CHROMA JUNGLE
C306 50V 4.7
C303 16V 22
R304 270k
C305 50V 0.33
R614 2.2k
R615 2.2k
R616 2.2k
C304 50V
X601 TS816M32
C302 15p
C109 6.3V 470
C110 0.01
L102 1.5
L103 1.5
TPA10
C104
IC551 AN78M09
9V AVR
TP186
L571 68
D454 MA4120M
16V
9V
5V
5V
UNER
R001
V56808G3
BT
AGC
BN
IF
ENABLE
DATA
CLOCK
BPL
BTL
SDA
SCL
R103 18k
L021 39
C026 16V 1000
L55G EXCELSA35
R010 1.8k
R011
R015 3.9k
MTC

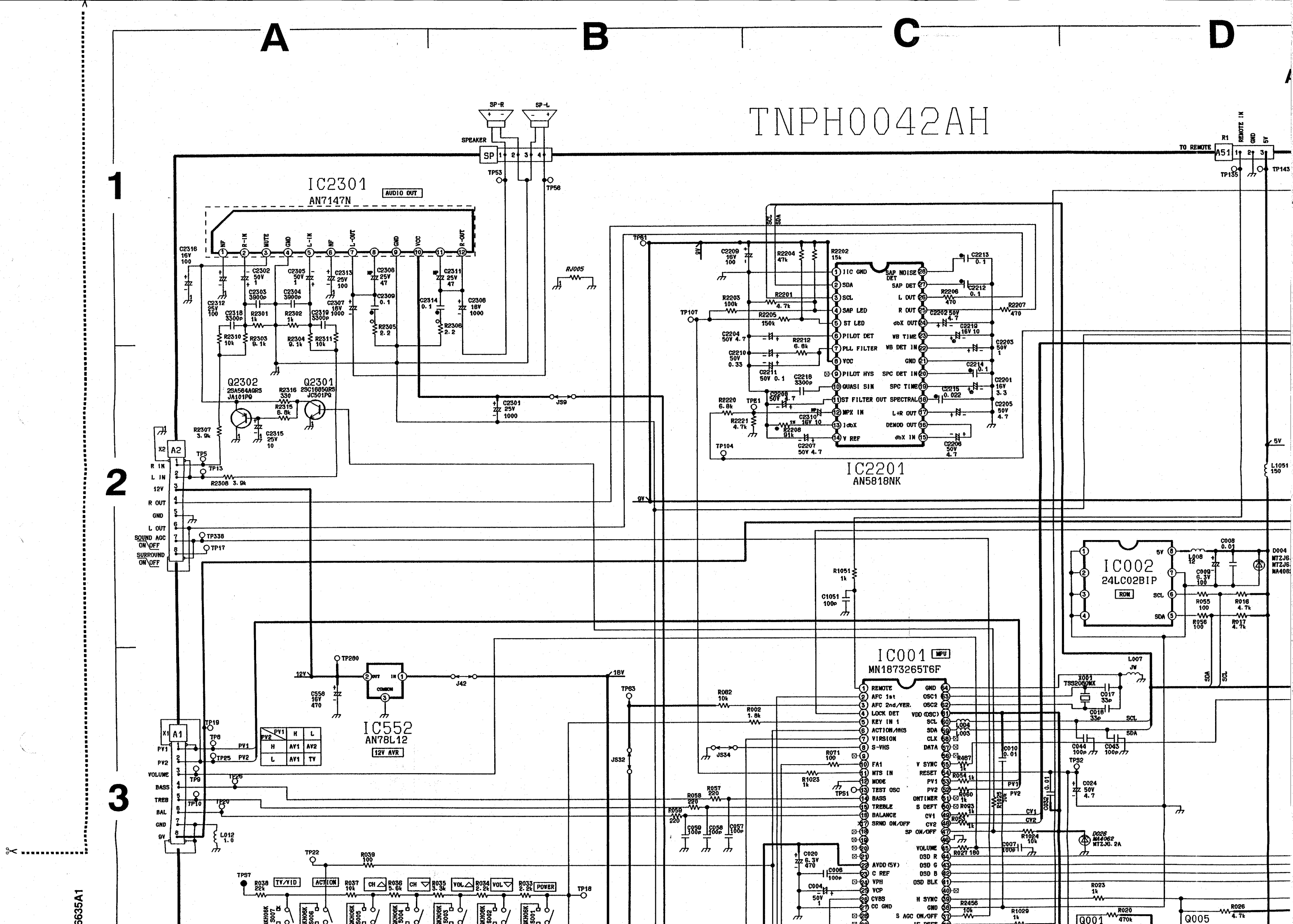
CV2 \ CV1	H	L
H	TV2	AV2
L	AV1	TV1


R010 1.8k
R011 680
R012 680
R013 680
R015 3.9k
JS31
JS8
5V
C306 50V 4.7
C303 16V 22
R304 270k
C305 50V 0.33
C304 50V 1.0
R305 1k
R306 1k
C312 16V 22
R614 2.2k
R615 2.2k
R616 2.2
R617 2.2k
R604 330
R605 330
R606 330
C302 10V 330
TP47R
TP47G
TP47B
X601
C110 0.01
L102 1.5
L103 1.5
X101 EFCKM1963M
L109 1.0
L108 1.0
5V
TPA10
C201 68p
R203 3.9k
C202 0.01
L201 EQS7EN053B EIS7ES004B
C104 50V 0.22
C102 16V 10
R101 68k
SAW FILTER
C128 10V 330
5V
TP14
R114 100k
R113 47k
Q101 2SC1685 JC501PQ
R1030 47k
RF DEFEET
TP
FA2
R021 100
CLK
TP15
R323 100
TPS8
DATA
R022 100
FA1
FA2
SCL
TP15
TPS8
SDA
FA1
R044 330k
R045 680k
C308 0.022
SDA
SCL
TP315
R152 150k
It sink 10pin
IC451
LA7836-TV
V OUT
R464 120k
D452 MA165
CRT NECK PROTECTER
R466 100
Q452 2SC1685QRS JC501PQ
R470 15k
R471 270
Q451 2SC1685QRS JC501PQ
C460 50V 1.0
C458 50V 4.7
R460 10k
R463 220k
D453 MA165
R558 2.0 2W
A11 C1
6 7 8
R G B GND 9V
TP515
D554 AS01 AU01 ERA2204
C555 250V 22
C574 500V 560p
200V
1200V
R459 1k
C566 180p 2kV
C565 220p 2kV
C563 0.013 1.2kV
C564 3300p 1.2kV
L558 EXCELSA24
Q551 BU2508DF
H OUT
L553 EXCELSA24
D558 RS3FS
200V
C571 5600p 400V
C568 0.047 400V
D559 RU3M
L557 0SC9002 TSC910
DY KDY42H552F
V.H1 V.L2 H.L4 H.H6
DY 1 2 3 4 5 6
-20V 1V
R511 2.4k
RJ003 0 (25mmJW)
PCC COIL
L751 TLH15727
C569 0.56 DC 400V
L551 TLH6626P
OUT IN
R561 1k 2W
200Vp-p at 15.75KHz
250V
130V
C512 160V 33
30V
T551 KFT6AA022F
FBT
EHT
VF
VS
17 18
-30V
R568 4.7k
Q560 2SA564AQRS
R564 56k
R563 22k
220V
D563 MA165
TPD2
R557 10k
TPD1
R556 2.0k
D556 MTZJT-7739D MA4360H
C560 50V 2.2
C559 100V 22
R560 560 2W
D555 MA165
TP297
TPD6
(20mmJW) RJ004 0
A12 C2
GND HEATER 220V
HIGH VOLTAGE
FOCUS
SCREEN

MTC9606635A1

Sheet 1 of 4
Side B

A–Board Schematic
CT–35G21U/UU/CU



A
B
C
D
1
2
3
TNPH0042AH
SP-R
SP-L
SPEAKER
SP
TP53
TP56
IC2301
AN7147N
AUDIO OUT
NF
R-IN
MUTE
GND
L-IN
NF
L-OUT
GND
VCC
R-OUT
C2316 16V 100
C2302 50V 1
C2305 50V 1
C2313 25V 100
C2308 25V 47
C2311 25V 47
C2312 25V 100
C2303 3900p
C2304 3900p
C2307 16V 1000
C2309 0.1
C2314 0.1
C2306 16V 1000
C2318 3300p
R2301 1k
R2302 1k
C2319 3300p
R2305 2.2
R2306 2.2
R2310 10k
R2303 9.1k
R2304 9.1k
R2311 10k
Q2302
2SA564AQRS
JA101PQ
Q2301
2SC1685QRS
JC501PQ
R2316 330
R2315 6.8k
C2315 25V 10
R2307 3.9k
C2301 25V 1000
JS9
RJ005
A2
X2
R IN
L IN
12V
R OUT
GND
L OUT
SOUND AGC ON\OFF
SURROUND ON\OFF
TP5
TP13
R2308 3.9k
TP338
TP17
TP81
9V
C2209 16V 100
R2204 47k
R2202 15k
SCL
SDA
IIC GND
SDA
SCL
SAP LED
ST LED
PILOT DET
PLL FILTER
VCC
PILOT HYS
QUASI SIN
ST FILTER OUT
MPX IN
ldbX
V REF
SAP NOISE DET
SAP DET
L OUT
R OUT
dbX OUT
WB TIME
WB DET IN
GND
SPC DET IN
SPC TIME
SPECTRAL
L+R OUT
DEMOD OUT
dbX IN
C2213 0.1
C2212 0.1
R2206 470
R2207 470
C2202 50V 4.7
C2219 16V 10
C2203 50V 1
C2214 0.1
C2201 16V 3.3
C2215 0.022
C2205 50V 4.7
C2206 50V 4.7
R2203 100k
R2201 4.7k
R2205 150k
TP107
C2204 50V 4.7
R2212 6.8k
C2210 50V 0.33
C2211 50V 0.1
C2216 3300p
C2208 50V 4.7
R2220 6.8k
TP61
C2310 16V 10
R2221 4.7k
R2208 91k
C2207 50V 4.7
TP104
IC2201
AN5818NK
TO REMOTE
R1
A51
REMOTE IN
GND
5V
TP135
TP143
5V
L1051 150
R1051 1k
C1051 100p
IC002
24LC02BIP
ROM
5V
SCL
SDA
L008 12
C008 0.01
C009 6.3V 100
D004 MTZJ6.2 MA4062
R055 100
R056 100
R016 4.7k
R017 4.7k
IC001
MPU
MN1873265T6F
REMOTE
AFC 1st
AFC 2nd/VER.
LOCK DET
KEY IN 1
ACTION/HHS
VIRSION
S-VHS
FA1
MTS IN
MODE
TEST OSC
BASS
TREBLE
BALANCE
SRND ON/OFF
AVDD (5V)
C REF
VPH
VCP
CVBS
CC GND
GND
OSC1
OSC2
VDD (OSC)
SCL
SDA
CLK
DATA
V SYNC
RESET
PV1
PV2
ONTIMER
S DEFT
CV1
CV2
SP ON/OFF
VOLUME
OSD R
OSD G
OSD B
OSD BLK
H SYNC
GND
S AGC ON/OFF
L007 JW
X001 TSS2080MX
C017 33p
C018 33p
C044 100p
C043 100p
TPS2
C024 50V 4.7
D026 MA4062 MTZJ6.2A
R1024 10k
C007 100p
R027 180
R023 1k
R020 470k
R026 4.7k
Q001
Q005
TP280
12V
C558 16V 470
IC552
AN78L12
12V AVR
OUT
IN
COMMON
J42
18V
TP63
JS32
R082 10k
R002 1.8k
JS34
R071 100
R1023 1k
TPS1
R058 220
R057 220
R059 220
C059 100p
C058 100p
C057 100p
C020 6.3V 470
C006 100p
C004 50V 1
R1029 1k
R2456 10k
C010 0.01
C032 0.01
R1025 10k
L004
L003
R487
R054 1k
R060 1k
R053 1k
R052 1k
A1
X1
PV1
PV2
VOLUME
BASS
TREB
BAL
GND
9V
TP19
TP8
TP25
TP9
TP26
TP10
TP20
L012 1.0
PV1
PV2
H
L
AV1
AV2
TV
TP22
R039 100
TPS7
R038 22k
TV/VID
ACTION
R037 10k
CH △
R036 5.6k
CH ▽
R035 3.3k
VOL △
R034 2.2k
VOL ▽
R033 2.2k
POWER
TP18
S007
S006
S005
S004
S003
S002
S001
6635A1

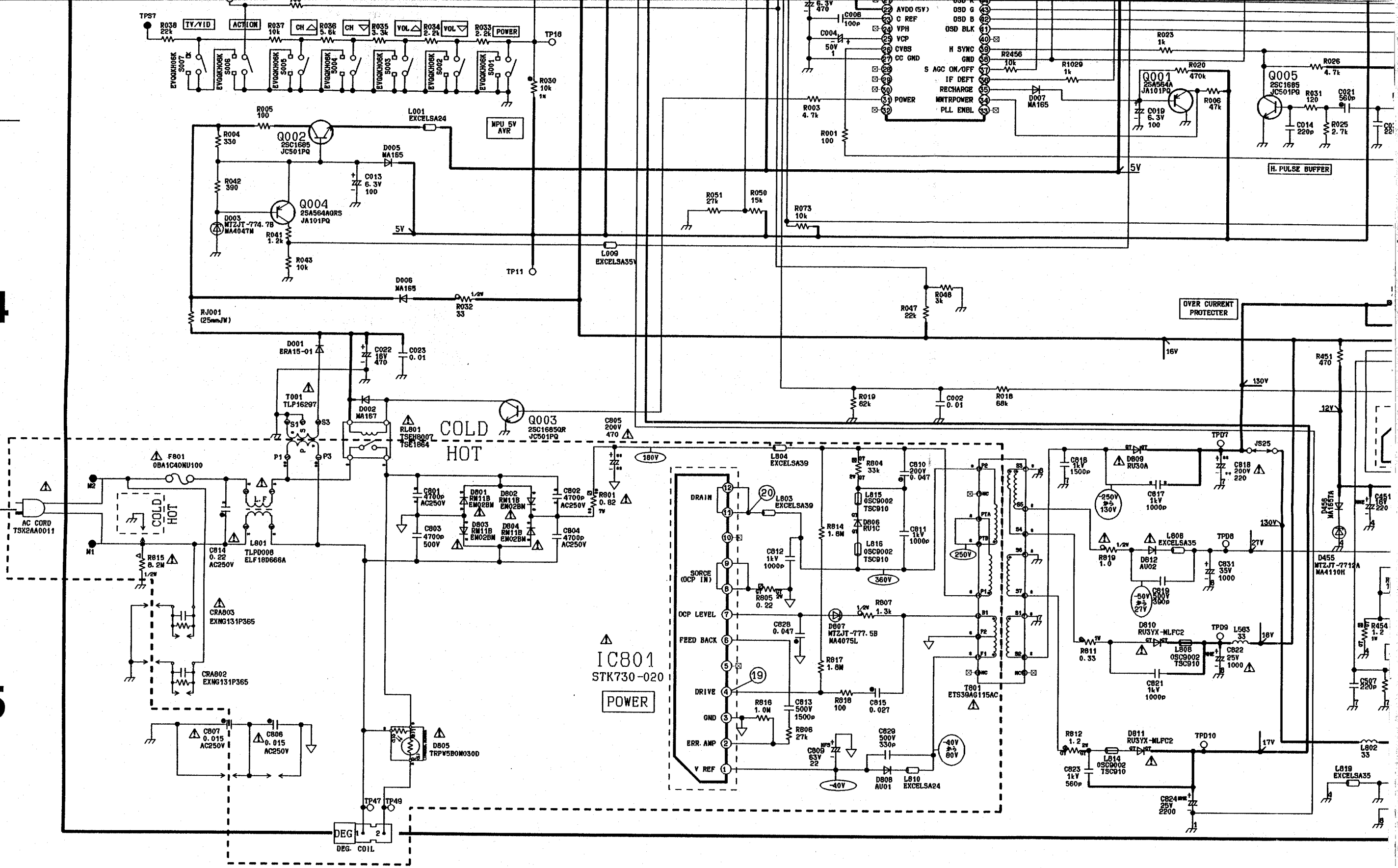
MTC960663SA1

Sheet 2 of 4
Side A

A–Board Schematic
CT–32S20U

4

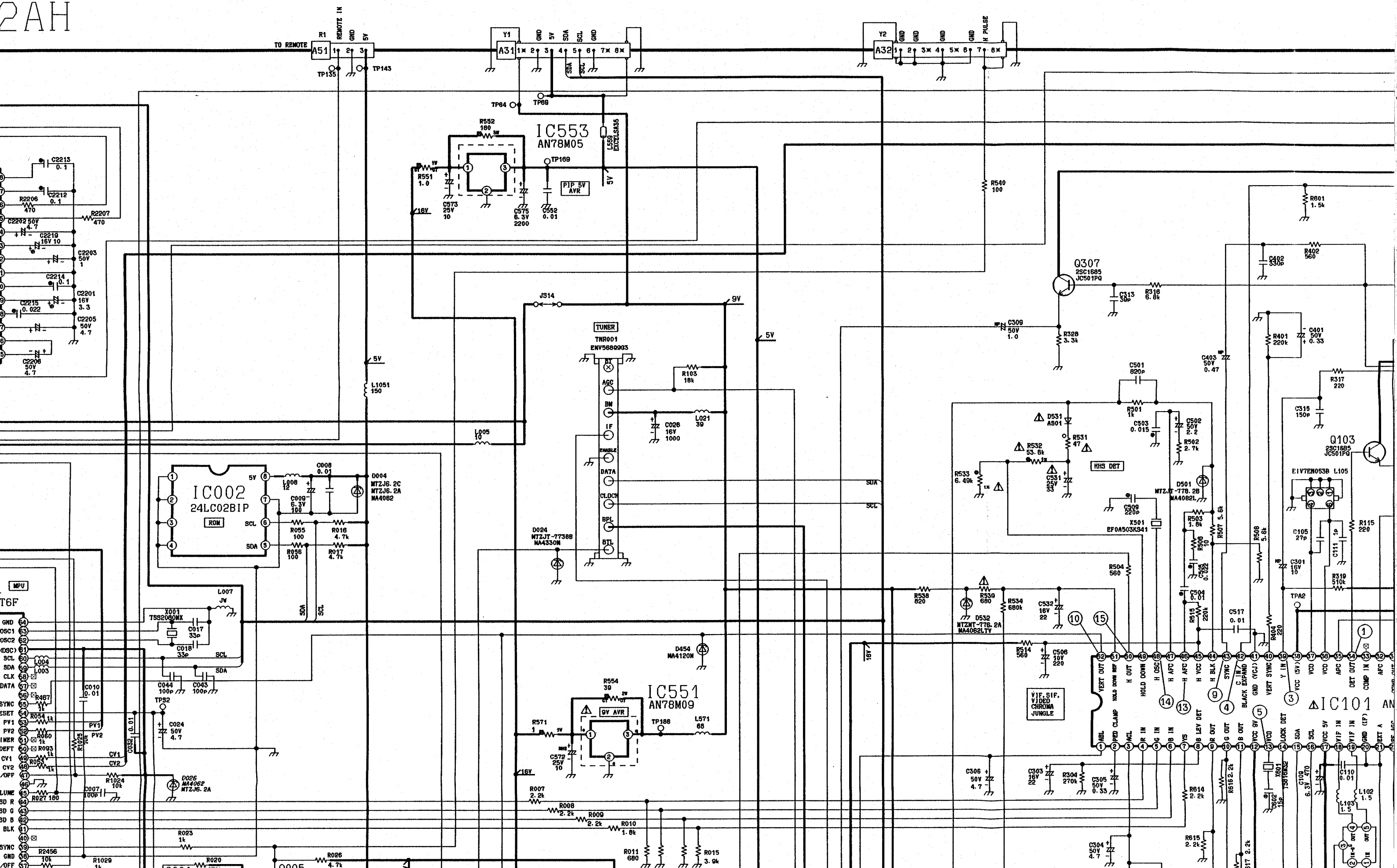
5

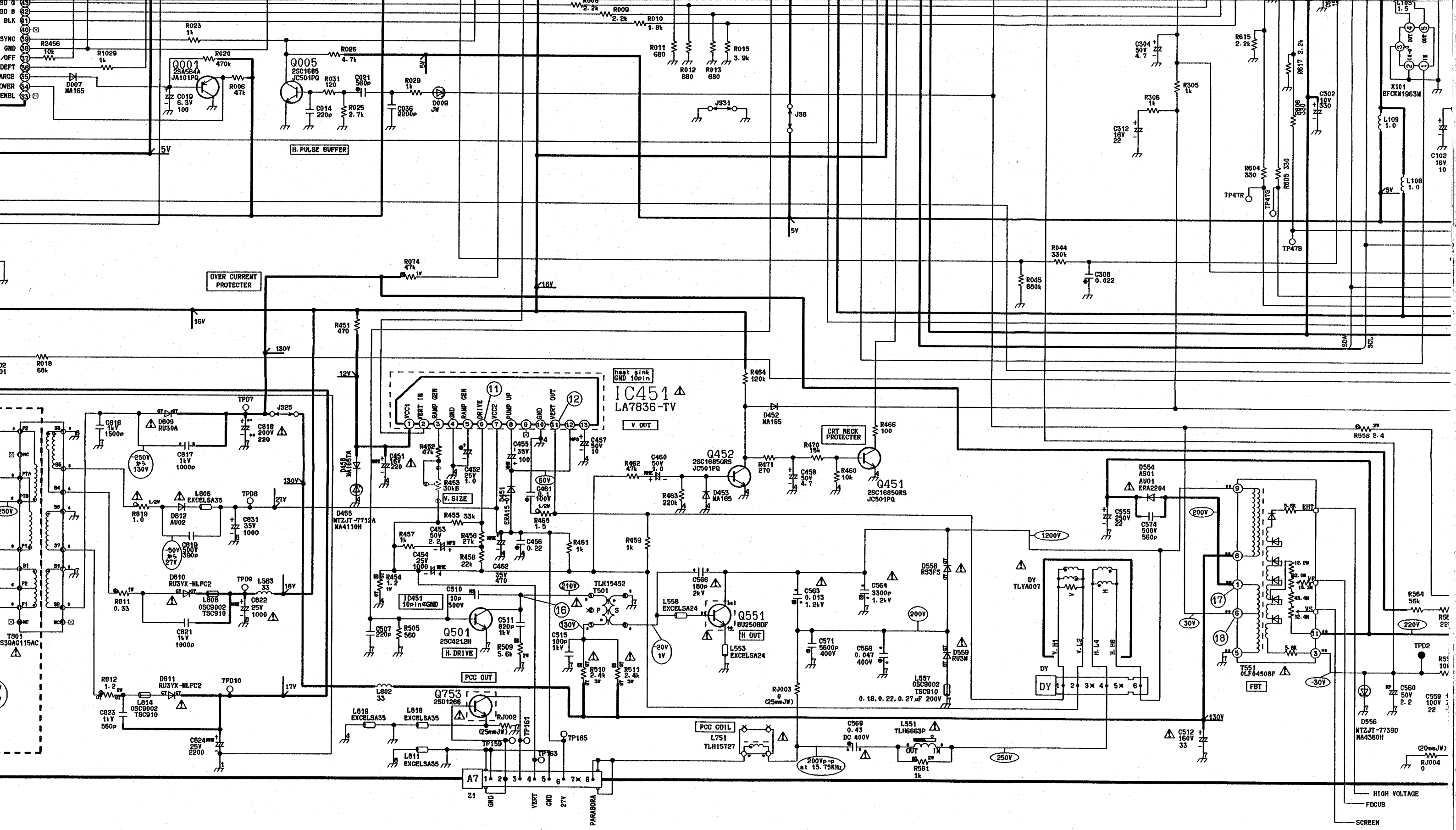

TPS7
R038 22k
TV/VID
ACTION
R037 10k
CH △
R036 5.6k
CH ▽
R035 3.3k
VOL △
R034 2.2k
VOL ▽
R033 2.2k
POWER
TP16
S007
S006
S005
S004
S003
S002
S001
EVQQKH06K
R030 10k
R005 100
L001 EXCELSA24
MPU 5V AVR
R004 330
Q002 2SC1685 JC501PQ
D005 MA165
C013 6.3V 100
R042 390
Q004 2SA564AQRS JA101PQ
D003 MTZJT-774.7B MA4047M
R041 1.2k
R043 10k
5V
L009 EXCELSA35V
TP11
D006 MA165
R032 33
RJ001 (25mmJW)
D001 ERA15-01
C022 16V 470
C023 0.01
T001 TLP16297
D002 MA157
Q003 2SC1685QR JC501PQ
RL801 TSE1664
COLD
HOT
F801 0BA1C40NU100
AC CORD TSX2AA0011
M2
M1
R815 8.2M
C814 0.22 AC250V
L801 TLP0008 ELF18D666A
CRA803 EXNG131P365
CRA802 EXNG131P365
C807 0.015 AC250V
C806 0.015 AC250V
C801 4700p AC250V
C803 4700p 500V
D801 RM11B EM02BM
D802 RM11B EM02BM
D803 RM11B EM02BM
D804 RM11B EM02BM
C802 4700p AC250V
C804 4700p AC250V
R801 0.82
C805 200V 470
180V
D805 TRPW5BOM030D
TP47
TP49
DEG
DEG. COIL
IC801
STK730-020
POWER
DRAIN
SORCE (OCP IN)
OCP LEVEL
FEED BACK
DRIVE
GND
ERR. AMP
V REF
L804 EXCELSA39
L803 EXCELSA39
R804 33k
C810 200V 0.047
L815 0SC9002 TSC910
D806 RU1C
L816 0SC9002 TSC910
C811 1kV 1000p
R814 1.8M
C812 1kV 1000p
R805 0.22
360V
C828 0.047
D807 MTZJT-777.5B MA4075L
R807 1.3k
R817 1.8M
R816 1.0M
C813 500V 1500p
R818 100
C815 0.027
R806 27k
C809 63V 22
C829 500V 330p
D808 AU01
L810 EXCELSA24
-40V
T801 ETS39AG115AC
250V
-40V 80V
AVDD (5V)
C REF
VPH
VCP
CVBS
CC GND
POWER
OSD G
OSD B
OSD BLK
H SYNC
GND
S AGC ON/OFF
IF DEFT
RECHARGE
MNTRPOWER
PLL ENBL
C008 100p
C004 50V 1
R003 4.7k
R001 100
R023 1k
R2456 10k
R1029 1k
D007 MA165
Q001 2SA564A JA101PQ
R020 470k
C019 6.3V 100
R006 47k
Q005 2SC1685 JC501PQ
R026 4.7k
R031 120
C021 560p
C014 220p
R025 2.7k
H. PULSE BUFFER
R051 27k
R050 15k
R073 10k
R048 3k
R047 22k
OVER CURRENT PROTECTER
16V
R019 82k
C002 0.01
R018 68k
R451 470
130V
12V
TPD7
JS25
C816 1kV 1500p
D809 RU30A
C818 200V 220
-250V 130V
C817 1kV 1000p
130V
D456 MA4047A
D455 MTZJT-7712A MA4110H
C451 16V 220
R819 1.0
L806 EXCELSA35
D812 AU02
TPD8
27V
C831 35V 1000
-50V 27V
C819 500V 390p
D810 RU3YX-NLFC2
TPD9
L563 33
18V
R811 0.33
L808 0SC9002 TSC910
C822 25V 1000
C821 1kV 1000p
R454 1.2
C507 220p
R812 1.2
D811 RU3YX-NLFC2
TPD10
17V
L814 0SC9002 TSC910
C823 1kV 560p
C824 25V 2200
L802 33
L819 EXCELSA35

IMPORTANT SAFETY NOTICE

THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES THAT ARE IMPORTANT FOR PROTECTION FROM X-RADIATION, FIRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS DESIGNATED WITH A ⚠ IN THE SCHEMATIC.

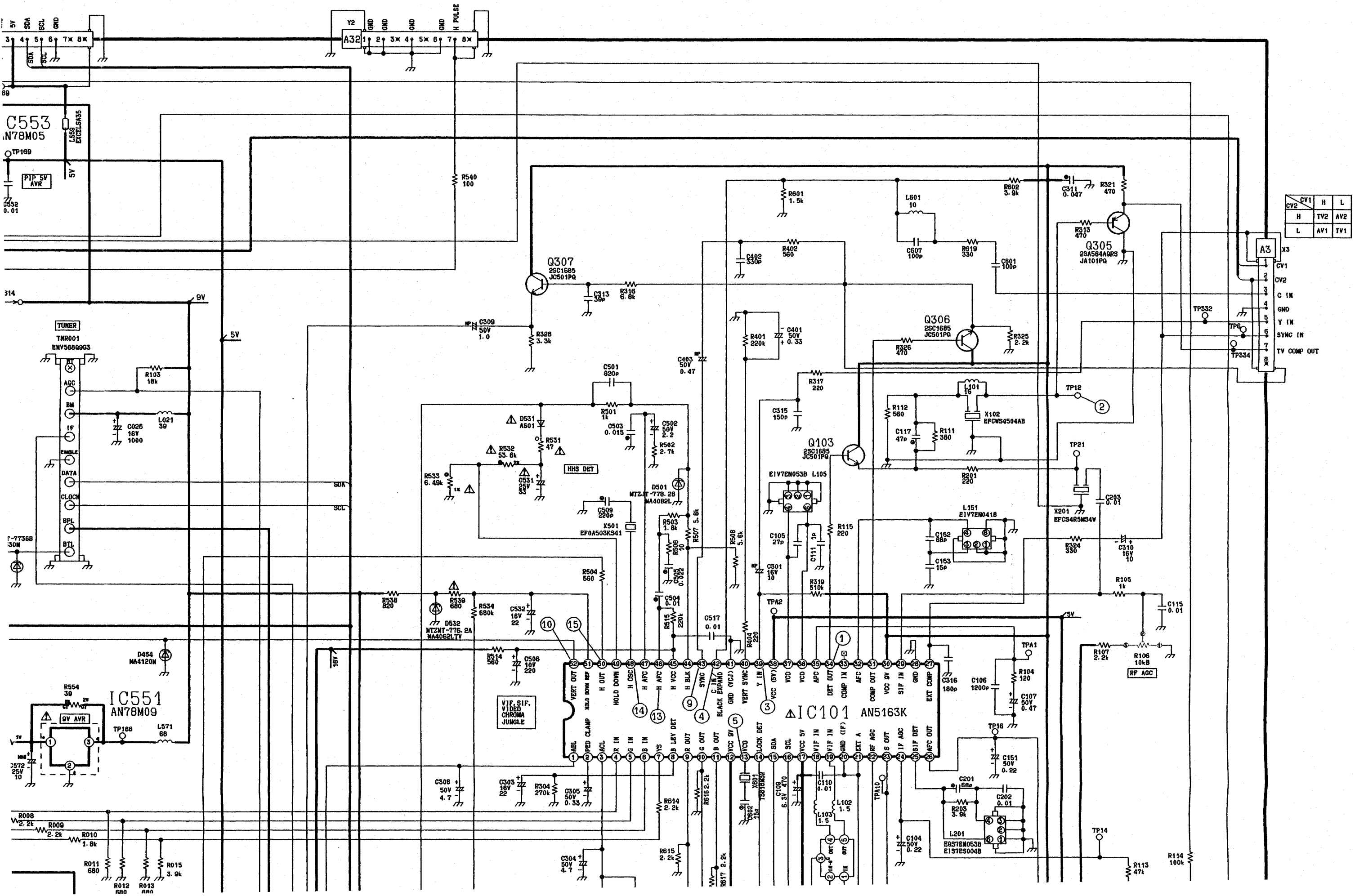
A–Board Schematic
CT–32S20U


2AH
TO REMOTE
R1
A51
REMOTE IN
GND
5V
TP135
TP143
Y1
A31
GND
5V
SDA
SCL
GND
Y2
A32
GND
GND
GND
GND
H PULSE
TP64
TP69
R552 180
IC553
AN78M05
L559 EXCELSA35
R551 1.0
TP169
C573 25V 10
C575 6.3V 2200
C552 0.01
PIP 5V AVR
5V
16V
R540 100
R601 1.5k
C2213 0.1
C2212 0.1
R2206 470
R2207 470
C2202 50V 4.7
C2219 16V 10
C2203 50V 1
C2214 0.1
C2201 16V 3.3
C2215 0.022
C2205 50V 4.7
C2206 50V 4.7
Q307
2SC1685 JC501PQ
C313 39p
R318 6.8k
C402 330p
R402 560
J314
9V
5V
C309 50V 1.0
R328 3.3k
TUNER
TNR001
ENV56889G3
AGC
BM
IF
ENABLE
DATA
CLOCK
BPL
BTL
R103 18k
C026 16V 1000
L021 39
R401 220k
C401 50V 0.33
C403 50V 0.47
R317 220
C501 820p
R501 1k
C503 0.015
C502 50V 2.2
R502 2.7k
D531 AS01
R531 47
R532 53.6k
R533 6.49k
C531 25V 33
HHS DET
C315 150p
Q103
2SC1685 JC501PQ
EIV7EN053B L105
L1051 150
L005 10
IC002
24LC02BIP
ROM
5V
SCL
SDA
L006 12
C008 0.01
C009 6.3V 100
D004 MTZJ6.2C MTZJ6.2A MA4062
R055 100
R016 4.7k
R056 100
R017 4.7k
D024 MTZJT-7738B MA4330N
SDA
SCL
C509 220p
X501 EF0A503KS41
D501 MTZJT-778.2B MA4082L
R503 1.8k
R506 10
R507 5.6k
R508 5.6k
C105 27p
C111 1p
R115 220
C301 16V 10
R319 510k
R504 560
MPU
T6F
L007 JW
X001 TSS2080MX
C017 33p
C018 33p
SCL
SDA
L004
L003
C010 0.01
R467 1k
R054 1k
R060 1k
R093 1k
R057 1k
PV1
PV2
CV1
CV2
R1025 10k
C032 0.01
C044 100p
C043 100p
TP52
C024 50V 4.7
D026 MA4062 MTZJ6.2A
C007 100p
R1024 10k
R027 180
R023 1k
R2456 10k
R1029 1k
R020
R026 4.7k
Q005
GND
OSC1
OSC2
(OSC)
SCL
SDA
CLK
DATA
SYNC
RESET
PV1
PV2
TIMER
DEFT
CV1
CV2
/OFF
LUME
3D R
3D G
3D B
BLK
SYNC
GND
/OFF
D454 MA4120N
R554 39
IC551
AN78M09
9V AVR
R571 1
TP188
L571 68
C572 25V 10
R007 2.2k
R008 2.2k
R009 2.2k
R010 1.8k
R011 680
R015 3.9k
R538 820
D532 MTZMT-776.2A MA4062LTY
R539 680
R534 680k
C532 16V 22
R514 560
C506 10V 220
C504 0.01
R515 220k
C517 0.01
R404 220
TPA2
VERT OUT
HOLD DOWN REF
H OUT
HOLD DOWN
H OSC
H AFC
H AFC
H VCC
H BLK
SYNC
C IN / BLACK EXPAND
GND (VCJ)
VERT SYNC
Y IN
VCC (5V)
VCO
VCO
APC
DET OUT
COMP IN
AFC
VIF, SIF, VIDEO CHROMA JUNGLE
ABL
PED CLAMP
ACL
R IN
G IN
B IN
YS
R LEV DET
R OUT
G OUT
B OUT
VCC 9V
VCO
LOCK DET
SDA
SCL
VCC 5V
VIF IN
VIF IN
GND (IF)
EXT A
IC101
AN
C306 50V 4.7
C303 16V 22
R304 270k
C305 50V 0.33
C304 50V 4.7
R614 2.2k
R615 2.2k
R616 2.2k
C602 15p
X601
C109 6.3V 470
C110 0.01
L103 1.5
L102 1.5
16V
1
3
4
5
9
10
13
14
15

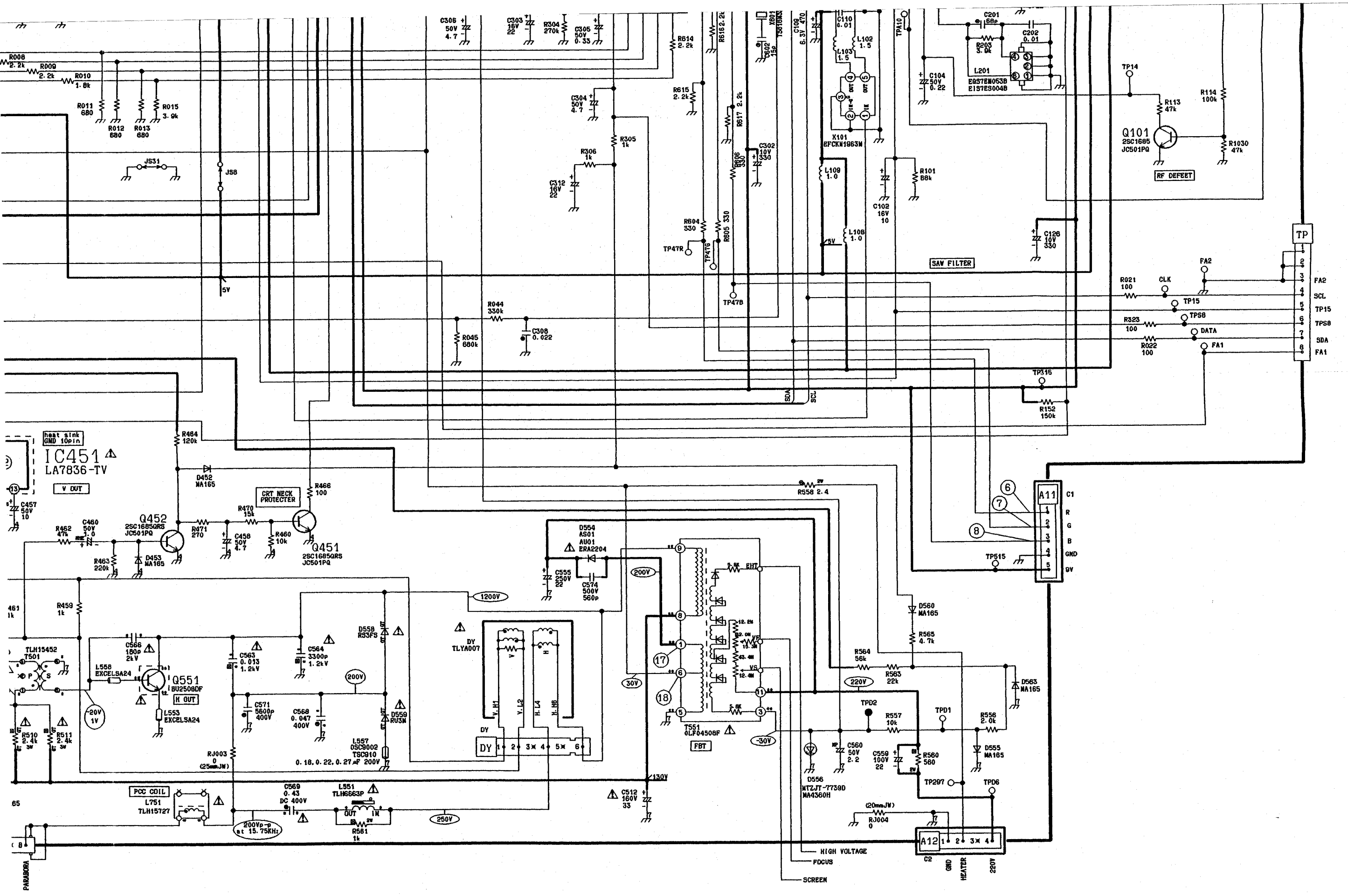

OVER CURRENT PROTECTER
H. PULSE BUFFER
Q001 2SA564A JA101PQ
Q005 2SC1685 JC501PQ
D007 MA165
D009 JW
IC451 LA7836-TV
heat sink GND 10pin
V OUT
VCC1
VERT IN
RAMP GEN
GND
RAMP GEN
DRIVE
VCC2
PUMP UP
GND
VERT OUT
V. SIZE
Q452 2SC1685QRS JC501PQ
Q451 2SC1685QRS JC501PQ
CRT NECK PROTECTER
D452 MA165
D453 MA165
D455 MTZJT-7712A MA4110H
D456 MA165TA
D451 ERA15-01
Q501 2SC4212H
H. DRIVE
IC451 10pin GND
Q551 BU2508DF
H OUT
Q753 2SD1266
PCC OUT
PCC COIL
L751 TLH15727
T501 TLH15452
T551 OLF04508F
FBT
DY TLYA007
DY
D554 AS01 AU01 ERA2204
D558 RS3FS
D559 RU3M
D556 MTZJT-7739D MA4360H
D809 RU30A
D810 RU3YX-MLFC2
D811 RU3YX-MLFC2
D812 AU02
T601 ETS39AG115AC
X101 EFCKM1963W
A7
GND
VERT
GND
27V
PARABORA
HIGH VOLTAGE
FOCUS
SCREEN
EHT
SDA
SCL
200Vp-p at 15.75kHz
1200V
250V
220V
200V
130V
-30V
30V
16V
12V
5V
27V
17V
210V
-20V 1V
60V
TP47R
TP47G
TP47B
TPD2
TPD7
TPD8
TPD9
TPD10
TP159
TP161
TP163
TP165
JS25
JS31
JS8
RJ003
RJ004
(25mmJW)
(20mmJW)
0.18, 0.22, 0.27μF 200V
⑪
⑫
⑯
⑰
⑱

E F G H

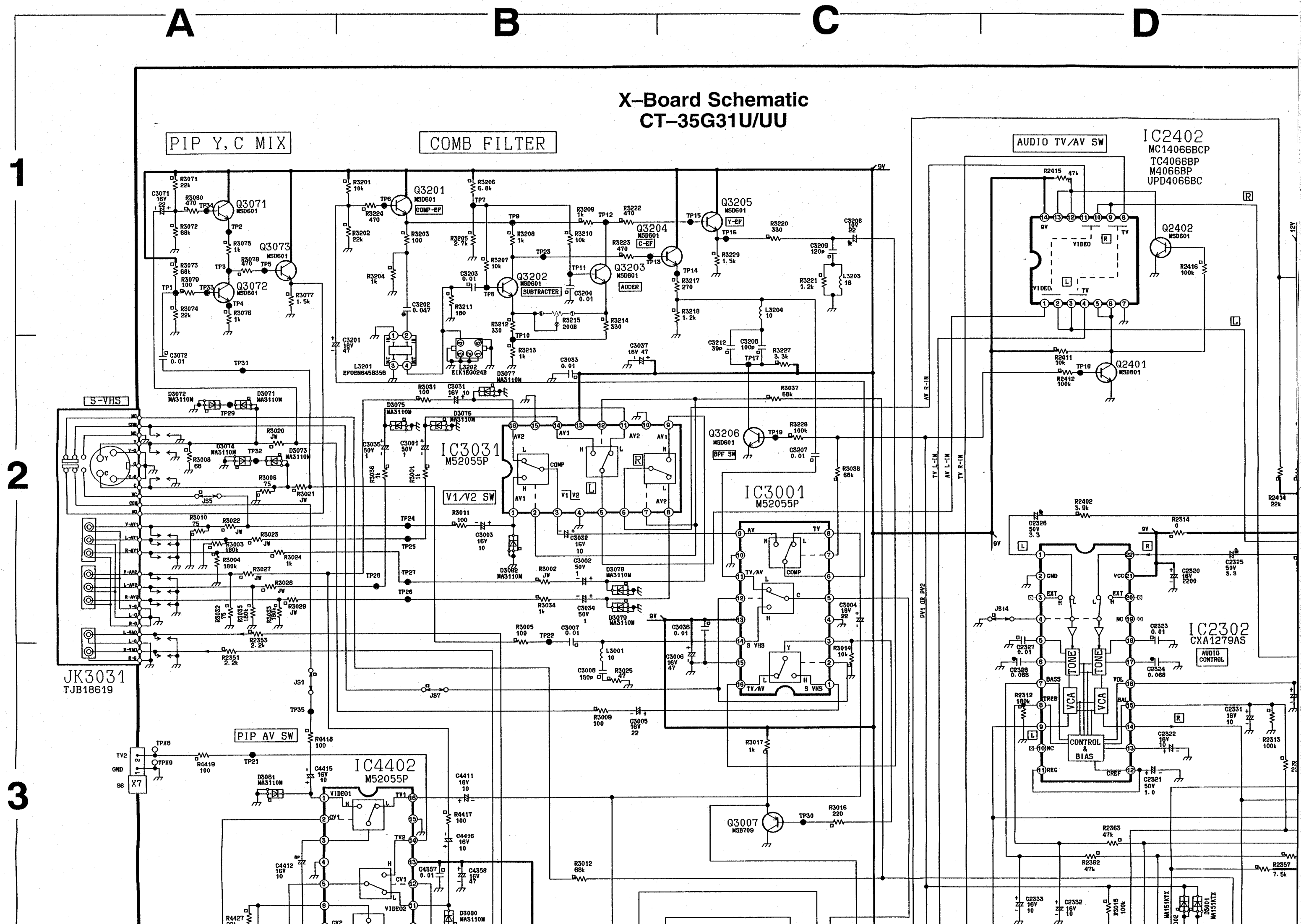
natic
J


IC553
AN78M05
L559 EXCELSA35
TP169
PIP 5V AVR
C552 0.01
5V
SDA
SCL
GND
A32
Y2
H PULSE
R540 100
Q307
2SC1685 JC501PQ
C313 39p
R316 6.8k
C309 50V 1.0
R328 3.3k
9V
5V
TUNER
TNR001
ENV56R09G3
AGC
BM
IF
ENABLE
DATA
CLOCK
BPL
BTL
R103 18k
C026 16V 1000
L021 39
C501 820p
R501 1k
C503 0.015
C502 50V 2.2
R502 2.7k
D531 AS01
R531 47
R532 53.6k
R533 6.49k
C531 25V 33
HHS DET
D501 MTZJT-778.2B MA4082L
C509 220p
X501 EF0A503K341
R503 1.8k
R506 10
R507 5.6k
C505 0.022
C504 0.01
R515 220k
R504 560
R538 820
R539 680
R534 680k
C532 16V 22
D532 MTZMT-776.2A MA4062LTV
R514 560
C506 10V 220
VIF, SIF, VIDEO CHROMA JUNGLE
D454 MA4120N
R554 39
IC551
AN78M09
9V AVR
TP166
L571 68
C572 25V 10
R008 2.2k
R009 2.2k
R010 1.8k
R011 680
R012 680
R013 680
R015 3.9k
C306 50V 4.7
C303 16V 22
R304 270k
C305 50V 0.33
C304 50V 4.7
R614 2.2k
R615 2.2k
R616 2.2k
R617 2.2k
C517 0.01
R404 220
R401 220k
C401 50V 0.33
C403 50V 0.47
C402 330p
R402 560
R508 5.6k
C301 16V 10
R601 1.5k
L601 10
C607 100p
R619 330
C601 100p
R602 3.9k
C311 0.047
R321 470
R313 470
Q305
2SA564AQRS JA101PQ
Q306
2SC1685 JC501PQ
R326 470
R325 2.2k
R317 220
C315 150p
Q103
2SC1685 JC501PQ
E1V7EN053B L105
C105 27p
C111 1p
R115 220
R319 510k
TPA2
R112 560
L101 16
X102 EFCWS4504AB
C117 47p
R111 360
R201 220
TP12
TP21
X201 EFCS4R5MS4W
C203 0.01
L151 E1V7EN041B
C152 68p
C153 15p
R324 330
C310 16V 10
R105 1k
C115 0.01
5V
TPA1
R104 120
C107 50V 0.47
C106 1200p
C316 180p
R107 2.2k
R106 10kB
RF AGC
TP16
C151 50V 0.22
C201 68p
C202 0.01
R203 3.9k
L201 EGS7EN053B E1S7ES004B
C104 50V 0.22
TP14
R113 47k
R114 100k
TPA10
C109 6.3V 470
C110 0.01
L102 1.5
L103 1.5
X601 TSS10N32
C602 15p
A3
X3
CV1
CV2
C IN
GND
Y IN
SYNC IN
TV COMP OUT
TP332
TP6
TP334
IC101 AN5163K
VERT OUT
HOLD DOWN REF
H OUT
HOLD DOWN
H OSC
H AFC
H AFC
H VCC
H BLK
SYNC
C IN / BLACK EXPAND
GND (VCJ)
VERT SYNC
Y IN
VCC (5V)
VCO
VCO
APC
DET OUT
COMP IN
AFC
COMP OUT
VCC 9V
SIF IN
GND
EXT COMP
ABL
PED CLAMP
ACL
R IN
G IN
B IN
YS
B LEV DET
R OUT
G OUT
B OUT
VCC 9V
VCO
LOCK DET
SDA
SCL
VCC 5V
VIF IN
VIF IN
GND (IF)
EXT A
RF AGC
S OUT
IF AGC
SIF DET
AFC OUT
①
②
③
④
⑤
⑨
⑩
⑬
⑭
⑮
18V

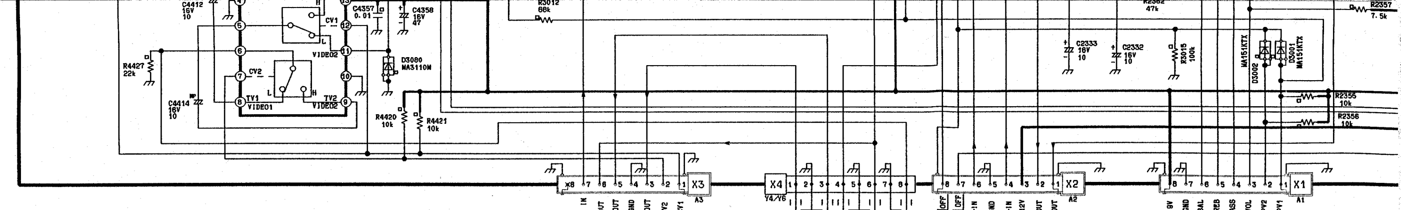
CV2 \ CV1	H	L
H	TV2	AV2
L	AV1	TV1


R008 2.2k
R009 2.2k
R010 1.8k
R011 680
R012 680
R013 680
R015 3.9k
JS31
J88
5V
C306 50V 4.7
C303 16V 22
R304 270k
C305 50V 0.33
C304 50V 4.7
R305 1k
R306 1k
C312 16V 22
R614 2.2k
R615 2.2k
R616 2.2k
R617 2.2k
R606 330
R604 330
R605 330
TP47R
TP47G
TP47B
X601
C602
C302 10V 330
C109 6.3V 470
C110 0.01
L102 1.5
L103 1.5
X101 EFCKN1863M
L109 1.0
L108 1.0
5V
TPA10
C102 16V 10
R101 68k
C104 50V 0.22
C201 68p
C202 0.01
R203 5.6k
L201 EQ37EM053B EIS7ES004B
SAW FILTER
C126 10V 330
TP14
R114 100k
R113 47k
Q101 2SC1685 JC501PQ
R1030 47k
RF DEFEET
TP
FA2
CLK
R021 100
TP15
TP58
R323 100
DATA
R022 100
FA1
1 2 3 4 5 6 7 8
FA2
SCL
TP15
TPS8
SDA
FA1
R044 330k
R045 680k
C308 0.022
SDA
SCL
TP316
R152 150k
heat sink GND 10pin
IC451 LA7836-TV
V OUT
13
C457 50V 10
R464 120k
D452 MA165
CRT NECK PROTECTER
R466 100
Q452 2SC1685QRS JC501PQ
R470 15k
R471 270
C458 50V 4.7
R460 10k
Q451 2SC1685QRS JC501PQ
R462 47k
C460 50V 1.0
R463 220k
D453 MA165
R461 1k
R459 1k
TLH15452 T501
P S
L558 EXCELSA24
C566 180p 2kV
Q551 BU2508DF
H OUT
L553 EXCELSA24
-20V (1V)
R510 2.4k 3W
R511 2.4k 3W
65
PARABORA
8
C563 0.013 1.2kV
C564 3300p 1.2kV
200V
C571 5600p 400V
C568 0.047 400V
RJ003 0 (25mmJW)
D558 R53FS
D559 RU3M
L557 0SC0002 TSC910
0.18, 0.22, 0.27 μF 200V
1200V
PCC COIL L751 TLH15727
C569 0.43 DC 400V
L551 TLH6663P
OUT IN
R581 1k
250V
200Vp-p at 15.75KHz
DY TLYA007
V H
V.H1 V.L2 H.L4 H.H6
DY
1 2 3 4 5 6
D554 AS01 AU01 ERA2204
C555 250V 22
C574 500V 560p
200V
9 8 1 6 5 11 3
17 18
30V
EHT
VS
T551 OLF04508F
FBT
C512 160V 33
130V
-30V
R558 2.4
D560 MA165
R565 4.7k
R564 56k
R563 22k
220V
D563 MA165
TPD2
R557 10k
TPD1
R556 2.0k
C560 50V 2.2
C559 100V 22
R560 560
D555 MA165
D556 MTZJT-7739D MA4360H
TP297
TPD6
(20mmJW) RJ004 0
A12 1 2 3 4
C2
GND
HEATER
220V
HIGH VOLTAGE
FOCUS
SCREEN
A11
C1
6 7 8
R G B GND 9V
1 2 3 4 5
TP515

X–Board Schematic
CT–35G31U/UU



A
B
C
D
1
2
3
PIP Y,C MIX
COMB FILTER
AUDIO TV/AV SW
IC2402
MC14066BCP
TC4066BP
M4066BP
UPD4066BC
Q3071 MSD601
Q3072 MSD601
Q3073 MSD601
Q3201 MSD601 COMP-EF
Q3202 MSD601 SUBTRACTER
Q3203 MSD601 ADDER
Q3204 MSD601 C-EF
Q3205 MSD601 Y-EF
Q3206 MSD601 BPF SW
Q2401 MSD601
Q2402 MSD601
Q3007 MSB709
IC3031 M52055P
V1/V2 SW
IC3001 M52055P
IC4402 M52055P
PIP AV SW
IC2302 CXA1279AS
AUDIO CONTROL
TONE
VCA
CONTROL & BIAS
S-VHS
JK3031 TJB18619
L3201 EFDEN645B358
L3202 EIK1E6024B
9V
TV2
GND
S6
X7
TPX8
TPX9
R4419 100
TP21
D3081 MA3110M
R4418 100
C4415 16V 10
C4411 16V 10
R4417 100
C4416 16V 10
C4412 16V 10
C4357 0.01
C4358 16V 47
D3080 MA3110M
R4427
VIDEO1
VIDEO2
CV1
CV2
TV1
JS1
JS5
JS7
JS14
TP35
R3017 1k
TP30
R3016 220
R3012 68k
R3009 100
C3005 16V 22
AV R-IN
TV L-IN
AV L-IN
TV R-IN
PV1 OR PV2
R2415 47k
R2416 100k
R2411 10k
R2412 100k
TP18
R2402 3.9k
R2314 0
R2414 22k
C2326 50V 3.3
C2320 16V 2200
C2325 50V 3.3
C2323 0.01
C2324 0.068
C2327 0.01
C2328 0.068
C2331 16V 10
C2322 16V 10
C2321 50V 1.0
R2312 180k
R2313 100k
R2363 47k
R2362 47k
R2357 7.5k
C2333 16V 10
C2332 16V 10
R3015 100k
MA151KTX
D3001 MA151KTX
GND
EXT
VCC
NC
BASS
TREB
VOL
BAL
REG
CREF
R3071 22k
R3080 470
C3071 16V 22
R3072 68k
R3075 1k
R3078 470
R3073 68k
R3079 100
R3074 22k
R3076 1k
R3077 1.5k
C3072 0.01
R3201 10k
R3224 470
R3202 22k
R3203 100
R3204 1k
C3202 0.047
C3201 16V 47
R3206 6.8k
R3205 2.7k
R3208 1k
R3207 10k
C3203 0.01
R3211 180
R3212 330
R3213 1k
R3215 200B
R3214 330
R3209 1k
R3210 10k
C3204 0.01
R3222 470
R3223 470
R3217 270
R3218 1.2k
R3220 330
R3229 1.5k
C3209 120p
R3221 1.2k
L3203 18
C3206 10V 22
L3204 10
C3212 39p
C3208 100p
R3227 3.3k
C3037 16V 47
C3033 0.01
R3031 100
C3031 16V 10
D3077 MA3110M
R3037 68k
R3228 100k
C3207 0.01
R3038 68k
D3072 MA3110M
D3071 MA3110M
D3075 MA3110M
D3076 MA3110M
D3074 MA3110M
D3073 MA3110M
R3008 68
R3020 JW
R3006 75
R3021 JW
C3035 50V 1
C3001 50V 1
R3036 1k
R3001 1k
R3010 75
R3022 JW
R3023 JW
R3003 180k
R3024 1k
R3004 180k
R3027 JW
R3028 JW
R3029 JW
R3032 75
R3035 180k
R3033 180k
R2353 2.2k
R2351 2.2k
R3011 100
C3003 16V 10
D3082 MA3110M
C3032 16V 10
R3002 JW
C3002 50V 1
D3078 MA3110M
R3034 1k
C3034 50V 1
D3079 MA3110M
R3005 100
C3007 0.01
L3001 10
C3008 150p
R3025 47
C3036 0.01
C3006 16V 47
C3004 16V 22
R3014 10k
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
TP11
TP12
TP13
TP14
TP15
TP16
TP17
TP19
TP22
TP23
TP24
TP25
TP26
TP27
TP28
TP29
TP31
TP32
TP33
TP34
AV1
AV2
COMP
S VHS
TV/AV
V-AV1
L-AV1
R-AV1
Y-AV2
L-AV2
R-AV2
L-VAO
R-VAO

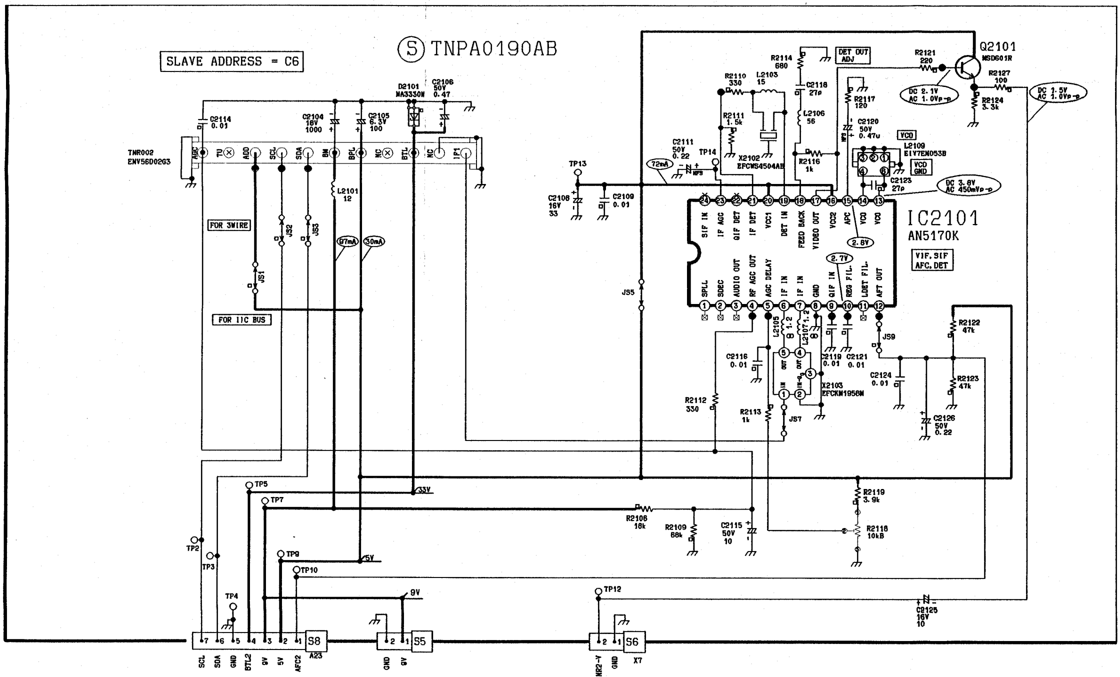

C4412
16V
10
R4427
22k
C4414
16V
10
CV1
CV2
TV1
VIDEO1
TV2
VIDEO2
VIDEO2
C4357
0.01
C4358
16V
47
D3080
MA3110M
R4420
10k
R4421
10k
R3012
68k
C2333
16V
10
C2332
16V
10
R3015
100k
MA151KTX
D3002
D3001
MA151KTX
R2362
47k
R2357
7.5k
R2356
10k
R2358
10k
X3
A3
TV COMP IN
SYNC OUT
Y OUT
GND
C OUT
CV2
CV1
X4
Y4/Y6
MIXED C IN
GND
MIXED Y IN
PARENT C OUT
GND
PARENT Y OUT
GND
CHILD COMP
Y4-1
Y4-2
Y4-3
Y6-1
Y6-2
Y6-3
Y6-4
Y6-5
X2
A2
SURROUND ON OFF
SOUND AGC ON OFF
TV L-IN
GND
TV R-IN
12V
L-OUT
R-OUT
X1
A1
9V
GND
BAL
TREB
BASS
VOL
PV2
PV1
AUDIO CONTROL

CV2 \ CV1	H	L
H	TV2	AV2
L	AV1	TV1

PV2 \ PV1	H	L
H	AV1	AV2
L	AV1	TV

S–Board Schematic
CT–35G31U/UU

4

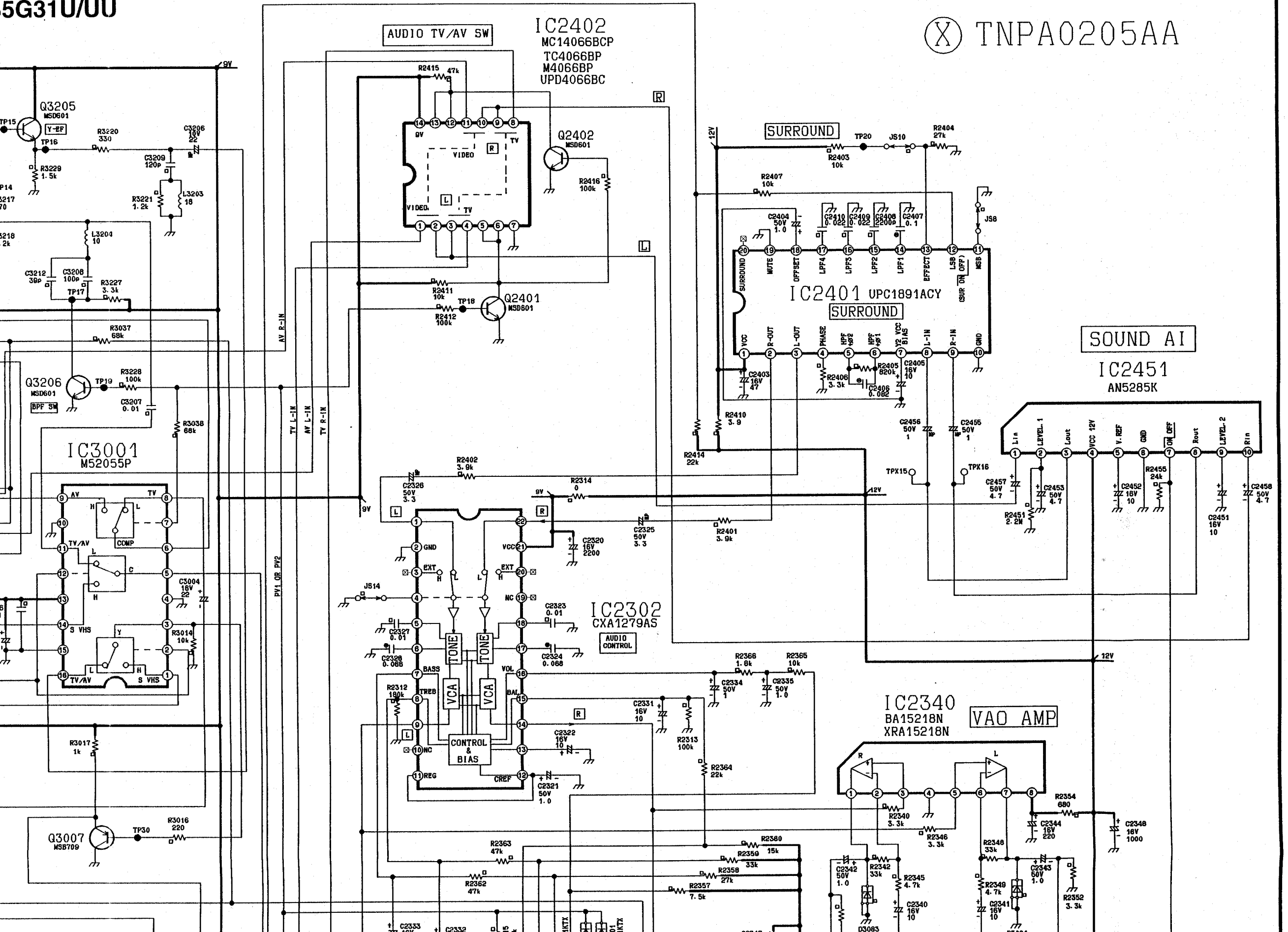

SLAVE ADDRESS = C6
S TNPA0190AB
TNR002
ENV56D02G3
AGC
TU
ADD
SCL
SDA
BM
BPL
NC
BTL
NC
IF1
C2114
0.01
C2104
16V
1000
C2105
6.3V
100
D2101
MA3330M
C2106
50V
0.47
L2101
12
FOR 3WIRE
JS2
JS3
67mA
30mA
JS1
FOR IIC BUS
TP5
TP7
33V
TP2
TP3
TP9
TP10
5V
TP4
9V
TP12
S8
A23
SCL
SDA
GND
BTL2
9V
5V
AFC2
S5
GND
9V
S6
X7
TNR2-V
GND
C2125
16V
10
R2108
18k
R2109
68k
C2115
50V
10
R2119
3.9k
R2118
10kB
R2112
330
R2113
1k
JS7
JS5
JS9
TP13
C2108
16V
33
C2109
0.01
TP14
C2111
50V
0.22
72mA
R2110
330
L2103
15
R2111
1.5k
X2102
EFCW54504AB
R2114
680
DET OUT
ADJ
C2118
27p
L2106
56
R2116
1k
R2117
120
C2120
50V
0.47u
VCO
L2109
EIV7EN053B
VCO
GND
C2123
27p
R2121
220
Q2101
MSD601R
R2127
100
R2124
3.3k
DC 2.1V
AC 1.0Vp-p
DC 1.5V
AC 1.0Vp-p
DC 3.8V
AC 450mVp-p
IC2101
AN5170K
VIF, SIF
AFC, DET
SIF IN
IF AGC
QIF DET
IF DET
VCC1
DET IN
FEED BACK
VIDEO OUT
VCC2
APC
VCO
VCO
2.8V
2.7V
SPLL
SDEC
AUDIO OUT
RF AGC OUT
AGC DELAY
IF IN
IF IN
GND
QIF IN
REG FIL
LDET FIL
AFT OUT
L2105
1.2
L2107
1.2
C2116
0.01
C2119
0.01
C2121
0.01
X2103
EFCKM1958M
C2124
0.01
R2122
47k
R2123
47k
C2126
50V
0.22

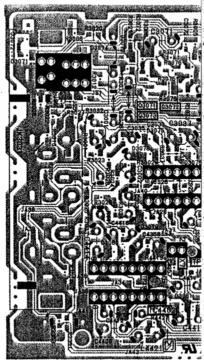
5

Vo

01 ..
02 ..
03 ..
04 ..
05 ..
06 ..
07 ..
08 ..
09 ..
10 ..
11 ..
12 ..

rd Schematic
5G31U/UU

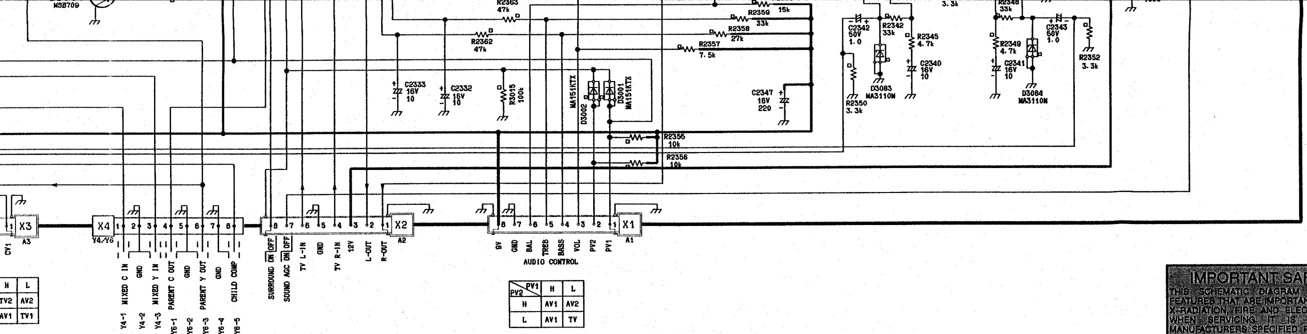

TNPA0205AA
AUDIO TV/AV SW
IC2402
MC14066BCP
TC4066BP
M4066BP
UPD4066BC
Q2402
MSD601
Q2401
MSD601
Q3205
MSD601
Q3206
MSD601
BPF SW
Y-EF
IC3001
M52055P
SURROUND
IC2401 UPC1891ACY
SURROUND
SOUND AI
IC2451
AN5285K
IC2302
CXA1279AS
AUDIO CONTROL
CONTROL & BIAS
TONE
VCA
IC2340
BA15218N
XRA15218N
VAO AMP
Q3007
MSB709
AV R-IN
TV L-IN
AV L-IN
TV R-IN
PV1 OR PV2
9V
12V
TP15
TP16
TP17
TP18
TP19
TP20
TP30
TPX15
TPX16
JS10
JS8
JS14
R2415 47k
R2416 100k
R2411 10k
R2412 100k
R2402 3.9k
R2314 0
R2401 3.9k
R2403 10k
R2404 27k
R2407 10k
R2405 820k
R2406 3.3k
R2410 3.9
R2414 22k
R2451 2.2M
R2455 24k
R2312 180k
R2313 100k
R2364 22k
R2366 1.8k
R2365 10k
R2363 47k
R2362 47k
R2360 15k
R2359 33k
R2358 27k
R2357 7.5k
R2340 3.3k
R2346 3.3k
R2342 33k
R2345 4.7k
R2348 33k
R2349 4.7k
R2352 3.3k
R2354 680
R3220 330
R3229 1.5k
R3221 1.2k
R3227 3.3k
R3037 68k
R3228 100k
R3038 68k
R3014 10k
R3017 1k
R3016 220
L3203 18
L3204 10
C3206 16V 22
C3209 120p
C3212 39p
C3208 100p
C3207 0.01
C3004 16V 22
C2404 50V 1.0
C2410 0.022
C2409 0.022
C2408 2200p
C2407 0.1
C2403 16V 47
C2406 0.082
C2405 16V 10
C2456 50V 1
C2455 50V 1
C2457 50V 4.7
C2453 50V 4.7
C2452 16V 10
C2451 16V 10
C2458 50V 4.7
C2326 50V 3.3
C2320 16V 2200
C2325 50V 3.3
C2323 0.01
C2327 0.01
C2328 0.068
C2324 0.068
C2334 50V 1
C2335 50V 1.0
C2331 16V 10
C2322 16V 10
C2321 50V 1.0
C2344 16V 220
C2348 16V 1000
C2342 50V 1.0
C2340 16V 10
C2343 50V 1.0
C2341 16V 10
D3083



Volta

01	6.02
02	0.00
03	N.C
04	0.00
05	6.19
06	6.23
07	2.86
08	2.13
09	6.05
10	N.C
11	2.55

IC3001	
01	
02	
03	
04	
05	
06	
07	
08	
09	
10	
11	
12	
13	
14	


MSB709
R2363 47k
R2359 15k
R2358 33k
R2362 47k
R2358 27k
R2357 7.5k
C2333 16V 10
C2332 16V 10
R3015 100k
MA151KTX
D3002
D3001 MA151KTX
C2347 16V 220
R2355 10k
R2356 10k
C2342 50V 1.0
R2342 33k
R2345 4.7k
C2340 16V 10
R2350 3.3k
D3083 MA3110M
3.3k
R2346 33k
R2349 4.7k
C2341 16V 10
C2343 50V 1.0
R2352 3.3k
D3084 MA3110M
X3
A3
CV1
X4
Y4/Y6
MIXED C IN
GND
MIXED Y IN
PARENT C OUT
GND
PARENT Y OUT
GND
CHILD COMP
Y4-1
Y4-2
Y4-3
Y6-1
Y6-2
Y6-3
Y6-4
Y6-5
X2
A2
SURROUND ON OFF
SOUND AGC ON OFF
TV L-IN
GND
TV R-IN
12V
L-OUT
R-OUT
X1
A1
9V
GND
BAL
TREB
BASS
VOL
PV2
PV1
AUDIO CONTROL
H L
TV2 AV2
AV1 TV1
PV1 PV2 H L
H AV1 AV2
L AV1 TV

09	
10	
11	
12	
13	
14	
15	
16	

IMPORTANT SAFETY NOTICE

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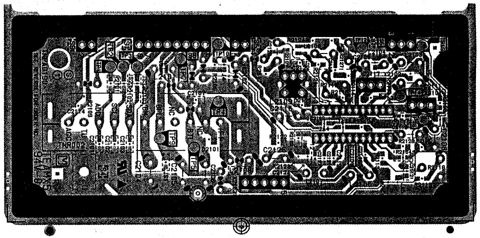
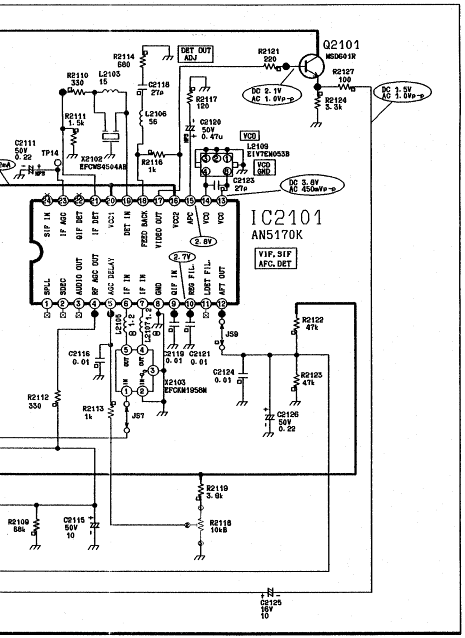
	Q2401
B	0.51
C	7.86
E	0.00

	Q3204
B	4.48
C	8.79
E	3.84

S–Board TNPA0190
CT–35G31U/UU



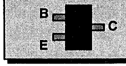

Q2101
MSD601R
R2121 220
R2127 100
R2124 3.3k
DC 2.1V AC 1.0Vp-p
DC 1.5V AC 1.0Vp-p
R2114 680
DET OUT ADJ
R2110 330
L2103 15
C2118 27p
L2106 56
R2117 120
C2120 50V 0.47u
VCO
L2109 EIV7EN053B
VCO GND
C2123 27p
DC 3.8V AC 450mVp-p
R2111 1.5k
C2111 50V 0.22
TP14
X2102 EFCWS4504AB
R2116 1k
SIF IN
IF AGC
QIF DET
IF DET
VCC1
DET IN
FEED BACK
VIDEO OUT
VCC2
APC
VCO
VCO
2.8V
2.7V
IC2101
AN5170K
VIF, SIF AFC, DET
SPLL
SDEC
AUDIO OUT
RF AGC OUT
AGC DELAY
IF IN
IF IN
GND
QIF IN
REG FIL.
LDET FIL.
AFT OUT
L2105 1.2
L2107 1.2
JS9
R2122 47k
C2116 0.01
C2119 0.01
C2121 0.01
C2124 0.01
R2123 47k
X2103 EFCKM1958N
R2112 330
R2113 1k
JS7
C2126 50V 0.22
R2119 3.9k
R2118 10kB
R2109 68k
C2115 50V 10
C2125 16V 10

Voltage Measurements – ”S”–Board

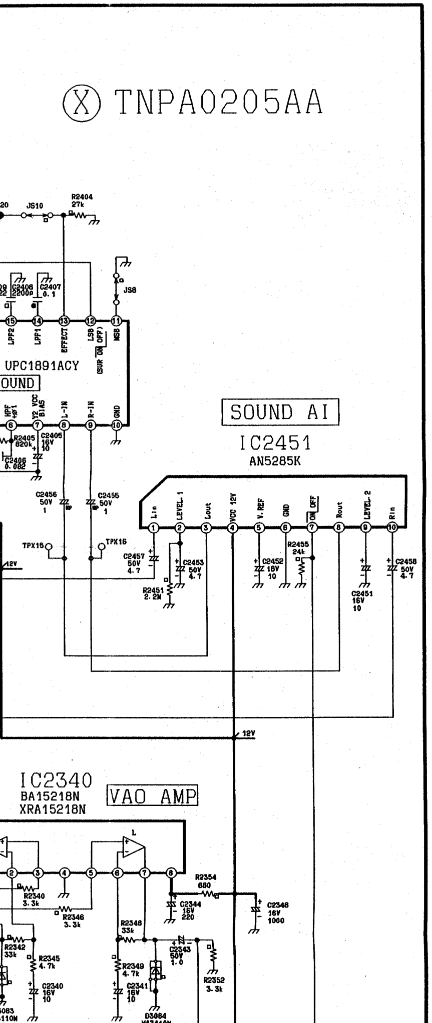
IC2101			
01	N.C	13	3.63
02	N.C	14	3.61
03	N.C	15	3.54
04	3.77	16	5.00
05	2.52	17	2.86
06	2.65	18	2.62
07	2.65	19	2.58
08	0.00	20	5.01
09	2.65	21	2.59
10	1.21	22	N.C
11	N.C	23	2.52
12	4.64	24	N.C

	Q2101
B	2.85
C	5.01
E	2.36

CHIP TRANSISTOR LEAD DESIGNATION

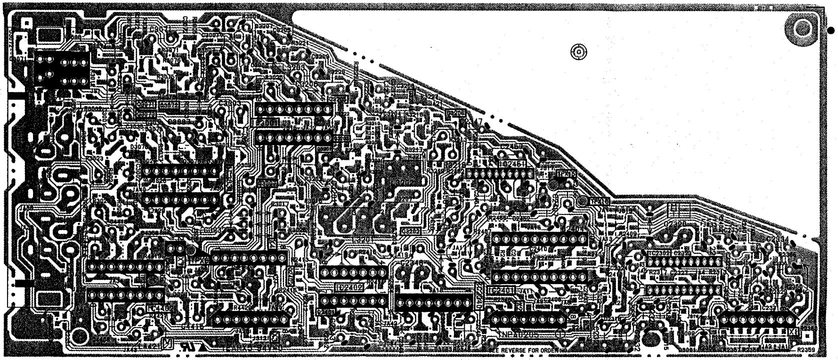


E F G H



Ⓧ TNPA0205AA
R2404
27k
JS10
JS8
C2408
2200P
C2407
0.1
15
14
13
12
11
LPF2
LPF1
EFFECT
LSB
(SUR ON OFF)
MSB
UPC1891ACY
OUND
HPF
Y2 VCC BIAS
L-IN
R-IN
GND
6
7
8
9
10
R2405
820k
C2405
16V
10
C2406
0.082
C2456
50V
1
C2455
50V
1
TPX15
TPX16
12V
SOUND AI
IC2451
AN5285K
Lin
LEVEL 1
Lout
VCC 12V
V.REF
GND
ON OFF
Rout
LEVEL 2
Rin
1
2
3
4
5
6
7
8
9
10
C2457
50V
4.7
C2453
50V
4.7
R2451
2.2M
C2452
16V
10
R2455
24k
C2451
16V
10
C2458
50V
4.7
12V
IC2340
BA15218N
XRA15218N
VAO AMP
L
R2340
3.3k
R2346
3.3k
R2342
33k
R2345
4.7k
C2340
16V
10
R2348
33k
R2349
4.7k
C2341
16V
10
R2354
680
C2344
16V
220
C2343
50V
1.0
R2352
3.3k
C2348
16V
1000
D3084

X–Board TNPA0205
All Receivers



Voltage Measurements – "X"–Board

IC2302			
01	6.02	12	2.55
02	0.00	13	6.05
03	N.C	14	6.05
04	0.00	15	2.53
05	6.19	16	0.32
06	6.23	17	6.22
07	2.86	18	6.19
08	2.13	19	N.C
09	6.05	20	N.C
10	N.C	21	11.98
11	2.55	22	6.02

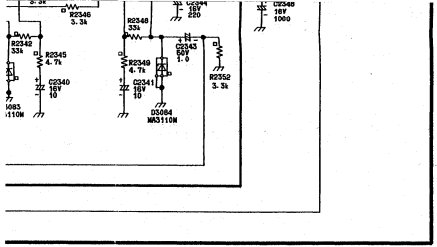
IC2401			
01	11.90	11	0.00
02	5.09	12	0.50
03	4.94	13	1.46
04	1.22	14	5.97
05	5.95	15	5.97
06	5.98	16	5.97
07	5.97	17	5.97
08	5.95	18	5.81
09	5.95	19	0.00
10	0.00	20	N.C

IC3001	
01	4.56
02	0.00
03	3.12
04	0.00
05	3.18
06	3.13
07	0.52
08	4.55
09	4.55
10	0.00
11	4.55
12	0.00
13	8.79
14	4.56
15	0.00

IC3031	
01	4.56
02	0.85
03	3.13
04	0.00
05	3.13
06	3.13
07	0.85
08	4.56
09	4.56
10	0.00
11	4.56
12	0.85
13	8.79
14	4.56
15	0.00

IC4402	
01	4.56
02	0.87
03	3.14
04	0.00
05	3.14
06	3.13
07	0.86
08	4.56
09	4.56
10	0.00
11	4.57
12	0.87
13	8.79
14	4.57
15	0.00

IC2402	
01	3.13
02	4.55
03	4.55
04	4.56
05	7.88
06	7.88
07	0.00
08	4.28
09	4.27
10	4.28
11	3.13
12	0.01
13	0.01
14	8.79


R2346
3.3k
R2348
33k
C2344
16V
220
C2348
16V
1000
R2342
33k
R2345
4.7k
C2343
50V
1.0
R2349
4.7k
R2352
3.3k
C2340
16V
10
C2341
16V
10
D3084
MA3110N

07	0.52
08	4.55
09	4.55
10	0.00
11	4.55
12	0.00
13	8.79
14	4.56
15	0.00
16	4.56

07	0.85
08	4.56
09	4.56
10	0.00
11	4.56
12	0.85
13	8.79
14	4.56
15	0.00
16	4.56

07	0.86
08	4.56
09	4.56
10	0.00
11	4.57
12	0.87
13	8.79
14	4.57
15	0.00
16	4.56

07	0.00
08	4.28
09	4.27
10	4.28
11	3.13
12	0.01
13	0.01
14	8.79

IC2451	
01	5.99
02	1.47
03	6.01
04	11.98
05	6.00
06	0.00
07	3.69
08	6.06
09	2.04
10	5.99

IC2340	
01	6.05
02	6.05
03	6.05
04	0.00
05	6.05
06	6.05
07	6.05
08	10.16

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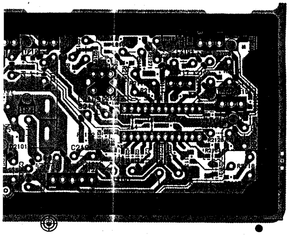
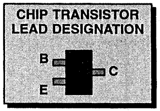
ard TNPA0190
-35G31U/UU



	Q2401	Q2402	Q3007	Q3071	Q3072	Q3073	Q3201	Q3202	Q3203
B	0.51	0.62	3.12	6.54	2.06	4.46	5.90	2.47	2.46
C	7.86	0.01	0.00	8.79	4.47	8.79	8.78	4.48	4.40
E	0.00	0.00	3.80	5.92	1.44	3.82	5.25	1.86	1.86

	Q3204	Q3205	Q3206
B	4.48	4.40	0.51
C	8.79	8.79	8.69
E	3.84	3.76	0.00

CHIP TRANSISTOR LEAD DESIGNATION



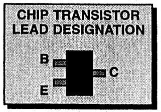
Note
Voltage levels indicated are for 35" Receivers. 32" Receivers may vary.

rements – "S"–Board

3.63
3.61
3.54
5.00
2.86
2.62
2.58
5.01
2.59
N.C
2.52
N.C

	Q2101
B	2.85
C	5.01
E	2.36

CHIP TRANSISTOR LEAD DESIGNATION



MTC960635A1

Sheet 2 of 4
Side B

S & X Boards Layout, Schematic
& Voltages – CT-35G31U/UU

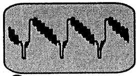
A B C D

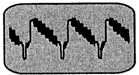
1

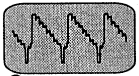
2

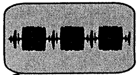
3

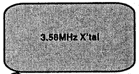
Waveforms – A-Board


① 1.5V p-p [20μs]
IC101 PIN 34 (DET OUT)
Schem. Loc. G–3

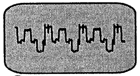

② 0.8V p-p [20μs]
TP12
Schem. Loc. H–2

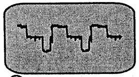

③ 0.5V p-p [20μs]
IC101 PIN 39 (Y IN)
Schem. Loc. G–3

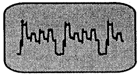

④ 0.3V p-p [20μs]
IC101 PIN 42 (C IN)
Schem. Loc. G–3

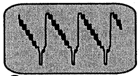


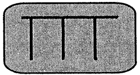
⑤ IC101 PIN 13
3.58VCO
OSC Waveform

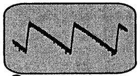

⑥ 4.2V p-p [20μs]
A11 PIN 1 (R)
Schem. Loc. G–5

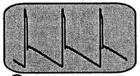

⑦ 3.8V p-p [20μs]
A11 PIN 2 (G)
Schem. Loc. G–5

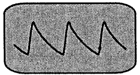

⑧ 3.7V p-p [20μs]
A11 PIN 3 (B)
Schem. Loc. G–5


⑨ 1.1V p-p [20μs]
IC101 PIN 43 (SYNC)
Schem. Loc. G–3

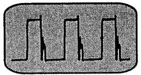

⑩ 4.3V p-p [5ms]
IC101 PIN 52 (VERT OUT)
Schem. Loc. F–3

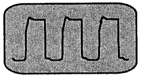

⑪ 2.0V p-p [5ms]
IC451 PIN 6 (DRIVE)
Schem. Loc. D–4

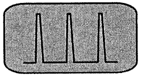

⑫ 52.4V p-p [5ms]
IC451 PIN 11 (VERT OUT)
Schem. Loc. E–4

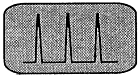

⑬ 1.7V p-p [20μs]
IC101 PIN 46 (H AFC)
Schem. Loc. G–3

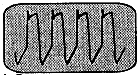
⑭ IC101 PIN 48
H OSC
OSC Waveform

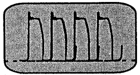

⑮ 2.4V p-p [20μs]
IC101 PIN 50 (H OUT)
Schem. Loc. F–3

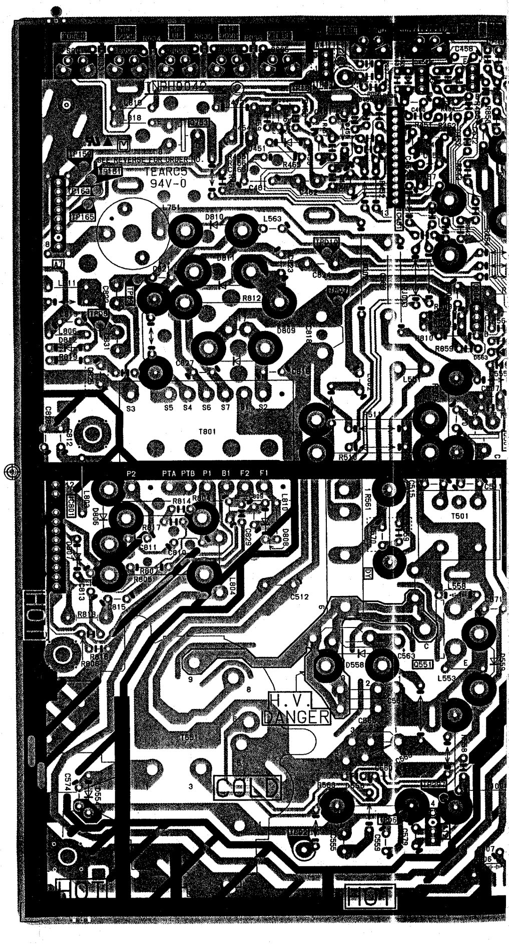

⑯ 186V p-p [20μs]
Q501 collector (H DRIVE)
Schem. Loc. E–5


⑰ 258V p-p [20μs]
T551 PIN 1
Schem. Loc. G–5


⑱ 29V p-p [20μs]
T551 PIN 6
Schem. Loc. G–5


⑲ 13.4V p-p [5μs]
IC801 PIN 4
Schem. Loc. B–5


⑳ 275V p-p [5μs]
IC801 PIN 11
Schem. Loc. B–5


SEE REVERSE FOR ORDER NO.
TEARC5
94V-0
L751
D810
L563
R812
D809
C827
S3
S5
S4
S6
S7
S2
T801
P2
PTA
PTB
P1
B1
F2
F1
R814
D806
C811
R807
R806
L804
C512
T501
L558
D558
C563
Q551
L553
H.V.
DANGER
T551
COLD
C574
HOT
HOT

Note
Voltage levels indicated are for

MTC9606635A1

Sheet 3 of 4
Side A

A–Board Layout, Waveforms,
Voltages & Misc. Notes

4

5

Note
Voltage levels indicated are for 35" Receivers. 32" Receivers may vary.

Waveform Measurements

1. ③ indicates waveform measurement. (Measurement can be taken at the best accessible location in common to the indicated point.)
2. Taken with a NTSC signal generator connected to the antenna terminal. (NTSC color bar pattern of 8 bars of EIA colors, 100 IRE white and 7.5 IRE black.)
3. Customer Controls (Picture/Audio Menu) are set to Normalize. Volume is set to "MIN".
4. All video and color waveforms are taken with a wideband scope and a probe with low capacitance (10 to 1). Shape and peak amplitudes may vary depending on the type of Oscilloscope used and its settings.
5. Ground symbol ⏚ shown on waveform number indicates (Hot) ground lead connection of the Oscilloscope.
   CAUTION: Incorrect ground connection of the test equipment will result in erroneous readings.

The waveforms are taken in the order of circuit flow through the various sections as follows:

VIDEO – Waveforms 1~3
COLOR – Waveforms 4~8
VERTICAL – Waveforms 9~12
HORIZONTAL – Waveforms 13~16
CRT DRIVE – Waveforms 17 & 18
POWER SUPPLY – Waveforms 19~20

Schematic Notes

1. Resistors are carbon 1/4W unless noted otherwise.
2. Capacitors are ceramic 50V unless noted otherwise.
3. Coil value noted is inductance in µH.
4. Test point indicated by ●; Test point but no pin ○.
5. Components indicated with ⚠ are critical parts and replacement should be made with manufacture specified replacement parts only.
6. **━ (BOLD LINE)** Indicates the route of B+ supply.
7. The schematic diagrams are current at the time of printing and are subject to change without notice.
8. Ground symbol ⏚ indicates **HOT GROUND CONNECTION;** ⊥ indicates COLD GROUND.
   NOTE: All other component symbols are used for engineering design purposes.

Voltage Measurements

1. Voltage measurement:
   - AC input to the Receiver is 120V. NTSC generator is connected to the antenna of the Receiver. (Color bar pattern of 100IRE white and 7.5 IRE black.)
   - All Picture and Audio adjustments are set to Normalize.
     TV ANT/CABLE – (Set-Up Menu) in TV/ANT Mode
     Volume – Min
     TV/Video SW – TV position
     Audio Mode – Stereo
   - Voltage readings are nominal and may vary ±10% on active devices. Some voltage reading will vary with signal strength and picture content.
   - Supply voltages are all nominal.
2. Ground symbol ⏚ indicates ground lead connection of meter.
   Caution: Incorrect ground connection will result in erroneous readings.

Tuner Voltage Chart

Enable, Data, and Clock have no DC readings. They are digital signals from the MPU.

NOTE: Voltage at the 30V test pin varies with channel selection. Refer to chart for sample tuning voltages of TV/CATV(CABLE) channels as shown.

Voltage Reading Are Nominal And May Vary ± 15%

– VHF –	
Ch. 02	4.0V
Ch. 06	8.2V
Ch. 07	7.0V
Ch. 13	9.3V

– UHF –	
Ch. 14	7.7V
Ch. 69	24V

– CABLE –					
1st Band		2nd Band		3rd Band	
Ch. 1	6.7V	Ch. 16	4.5V	Ch. 47	3.7V
Ch. 15	24.7V	Ch. 46	2.70V	Ch. 94	14.9V
Ch. 95	9.8V			Ch. 100	15.1V
Ch. 99	17.5V			Ch. 125	24.0V

MICROPROCESSOR PROGRAMMING FOR BAND TUNING/SWITCHING

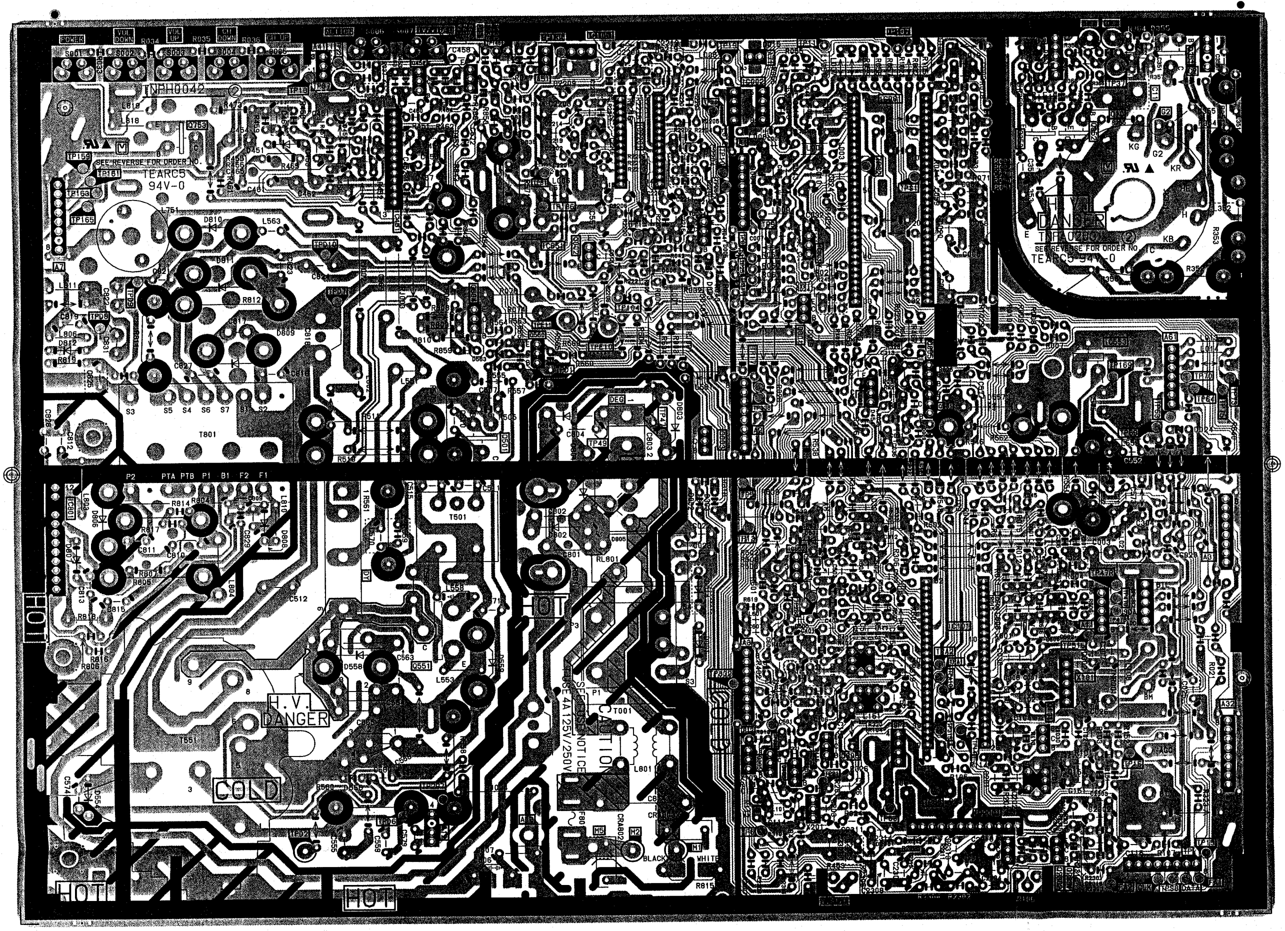
	54MHz ←→ 130MHz FIRST TUNING BAND	130MHz ←→ 360MHz SECOND TUNING BAND	360MHz ←→ 806MHz THIRD TUNING BAND
VHF	02~06	07~13	
UHF			14~69
CABLE	01~06,14, 15, 95~99	07~13, 16~46	47~94, 100~125

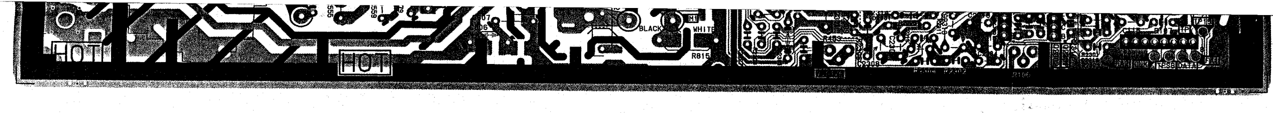
NOTE: CABLE channel numbers as recommended by the joint EIA/NCTA Engineering Committee and published as EIA INTERIM STANDARD NO. 6 – CABLE TELEVISION CHANNEL IDENTIFICATION PLAN – MAY 1983.

C D E F

A–Board TNPH0042
All Receivers

C–Board TNPA0203
32” Receivers


TNPH0042
SEE REVERSE FOR ORDER NO.
TEARC5
94V-0
T801
T501
T551
H.V. DANGER
COLD
HOT
CAUTION
T001
L801
RL801
BLACK
WHITE
TNPA0203
H.V. DANGER
SEE REVERSE FOR ORDER NO.
TEARC5 94V-0
KG
G2
KR
KB
POWER
VOL DOWN
VOL UP



Tuner Voltage Chart

Enable, Data, and Clock have no DC readings. They are digital signals from the MPU.

NOTE: Voltage at the 30V test pin varies with channel selection. Refer to chart for sample tuning voltages of TV/CATV(CABLE) channels as shown.

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– VHF –	
Ch. 02	4.0V
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Ch. 07	7.0V
Ch. 13	9.3V

– UHF –	
Ch. 14	7.7V
Ch. 69	24V

– CABLE –					
1st Band		2nd Band		3rd Band	
Ch. 1	6.7V	Ch. 16	4.5V	Ch. 47	3.7V
Ch. 15	24.7V	Ch. 46	2.70V	Ch. 94	14.9V
Ch. 95	9.8V			Ch. 100	15.1V
Ch. 99	17.5V			Ch. 125	24.0V

MICROPROCESSOR PROGRAMMING FOR BAND TUNING/SWITCHING

54MHz ◄──► 130MHz ◄──► 360MHz ◄──► 806MHz

	FIRST TUNING BAND	SECOND TUNING BAND	THIRD TUNING BAND
VHF	02~06	07~13	
UHF			14~69
CABLE	01~06,14, 15,95~99	07~13, 16~46	47~94, 100~125

NOTE: CABLE channel numbers as recommended by the joint EIA/NCTA Engineering Committee and published as EIA INTERIM STANDARD NO. 6 – CABLE TELEVISION CHANNEL IDENTIFICATION PLAN – MAY 1983.

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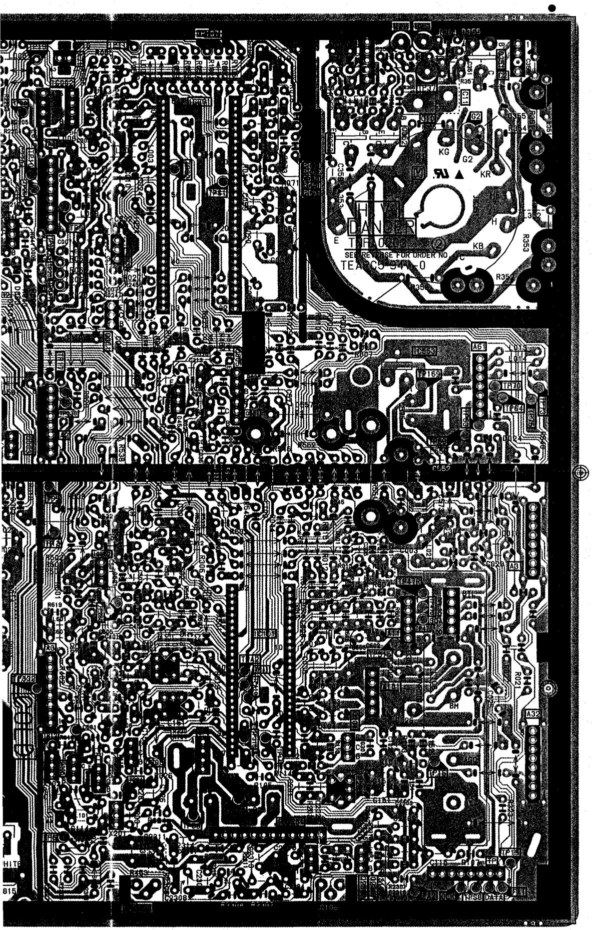
Board Index

"A"–Board – Main Chassis
"C"–Board – CRT Board
"L"–Board – Receiver Controls & Remote Receiver
"R"–Board – Remote Receiver
"S"–Board – Tuner (Second)
"X"–Board – A/V, S–Video, TV Switching, Comb Filter
"Y"–Board – PIP Processing
"Z"–Board – Pincushion Correction

042
s

C–Board TNPA0203
32” Receivers



Voltage Measurements ”A”–Board

IC001

01	5.17	33	N.C
02	2.24	34	5.17
03	4.64	35	5.20
04	3.91	36	0.00
05	5.18	37	5.19
06	2.00	38	0.00
07	0.00	39	3.73
08	0.00	40	N.C
09	N.C	41	0.00
10	5.19	42	0.00
11	1.29	43	0.00
12	0.00	44	0.00
13	N.C	45	0.13
14	3.06	46	0.00
15	2.76	47	0.00
16	3.00	48	0.00
17	0.00	49	0.00
18	N.C	50	N.C
19	N.C	51	N.C
20	N.C	52	0.00
21	N.C	53	0.00
22	5.20	54	5.15
23	0.00	55	4.11
24	N.C	56	N.C
25	1.28	57	N.C
26	1.88	58	N.C
27	0.00	59	4.21
28	N.C	60	4.26
29	N.C	61	5.20
30	N.C	62**	2.50
31	5.14	63	2.51
32	N.C	64	0.00

**** WARNING**
CRT shuts off when probing pin. Shut Receiver off and turn back on to continue testing

IC101

01	2.52	27	2.67
02	1.73	28	0.00
03	3.36	29	2.74
04	0.00	30	8.82
05	0.00	31	4.94
06	0.00	32	2.89
07	0.00	33	N.C
08	5.63	34	2.87
09	2.76	35	1.77
10	2.87	36	2.97
11	2.77	37	2.98
12	8.82	38	5.01
13	2.62	39	3.85
14	5.92	40	2.61
15	4.21	41	0.00
16	4.24	42	2.43
17	4.99	43	1.98
18	2.97	44	0.29
19	2.98	45	6.19
20	0.00	46	2.64
21	0.00	47	4.28
22	2.89	48	2.15
23	1.37	49	2.83
24	2.73	50	0.89
25	4.66	51	5.93
26	4.07	52	4.11

IC551

01	16.72
02	0.00
03	8.96

IC553

01	15.21
02	0.00
03	5.02

IC002

01	0.00
02	0.00
03	0.00
04	0.00
05	4.20
06	4.25
07	0.00
08	5.19

IC552

01	16.32
02	11.99
03	0.00

IC451

01	12.29
02	4.11
03	6.21
04	0.00
05	6.25
06	5.82
07	25.6
08	1.74
09	N.C
10	0.00
11	15.54
12	25.9
13	5.21

IC2201

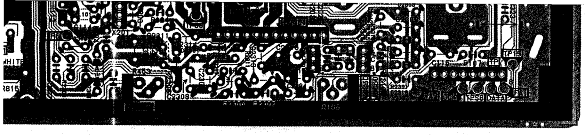
01	0.00	15	3.82
02	4.21	16	4.45
03	4.25	17	4.52
04	2.11	18	4.55
05	0.00	19	0.65
06	5.86	20	4.65
07	2.71	21	0.00
08	8.88	22	4.62
09	N.C	23	0.63
10	4.47	24	4.52
11	4.48	25	4.31
12	4.34	26	4.54
13	3.20	27	5.15
14	4.47	28	5.46

IC2301

01	1.26
02	0.00
03	17.83
04	0.00
05	0.00
06	1.25
07	9.40
08	17.00

IC801 ⏚

01	–39.3
02	–32.6
03	0.00
04	0.25
05	N.C
06	1.78
07	–0.35
08	0.21



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"Z"–Board – Pincushion Correction

IC2301		IC801 ▽	
01	1.26	01	–39.3
02	0.00	02	–32.6
03	17.83	03	0.00
04	0.00	04	0.25
05	0.00	05	N.C
06	1.25	06	1.78
07	9.40	07	–0.35
08	17.00	08	0.21
09	0.00	09	0.21
10	18.08	10	N.C
11	17.00	11	136.0
12	9.40	12	135.9

	Q001	Q002	Q003	Q004	Q005	Q101	Q103	Q305	Q306
B	5.18	5.82	0.75	4.96	–0.41	0.00	2.86	1.42	4.94
C	0.00	12.62	0.10	5.77	3.73	2.72	8.82	0.00	8.82
E	5.17	5.20	0.00	5.82	0.00	0.00	2.24	2.12	4.31

	Q307	Q451	Q452	Q501	Q551	Q753	Q2301	Q2302
B	4.27	0.00	0.16	0.31	–0.10	0.57	0.06	17.81
C	8.84	2.52	0.11	101.3	131.4	9.09	17.82	0.00
E	3.64	0.00	0.00	0.00	0.00	0.00	0.00	17.82

Note
Voltage levels indicated are for 35" Receivers. 32" Receivers may vary.

Note: Stereo Models

The Functions listed below are activated by a DC voltage change to DAC Inputs(Pin 5 and 6) of MPU IC001. Press and hold a function button on the Receiver to measure voltages.

FUNCTION	PIN 5	PIN 6
POWER	0V~0.443V	N/A
VOL ◀	0.797V~1.07V	N/A
VOL ▶	1.424V~1.696V	N/A
CH ▼	2.05V~2.323V	N/A
CH ▲	2.677V~2.95V	N/A
TV/VIDEO	3.304V~3.576V	N/A
ACTION	N/A	0V~0.443V

The AUDIO MODES being broadcast are displayed on screen in red by the voltage change to DAC input (Pin 11) of MPU IC001.

AUDIO MODE BROADCAST	PIN 11	
	MN1873265T6E	**MN1873265T6F**
MONO	4.087V~5.0V	4.244V~5.0V
SAP	2.207V~3.733V	2.364V~3.89V
STEREO	0.954V~1.853V	1.11V~2.01
STEREO & SAP	0V~0.6V	0V~0.756V

A B C D

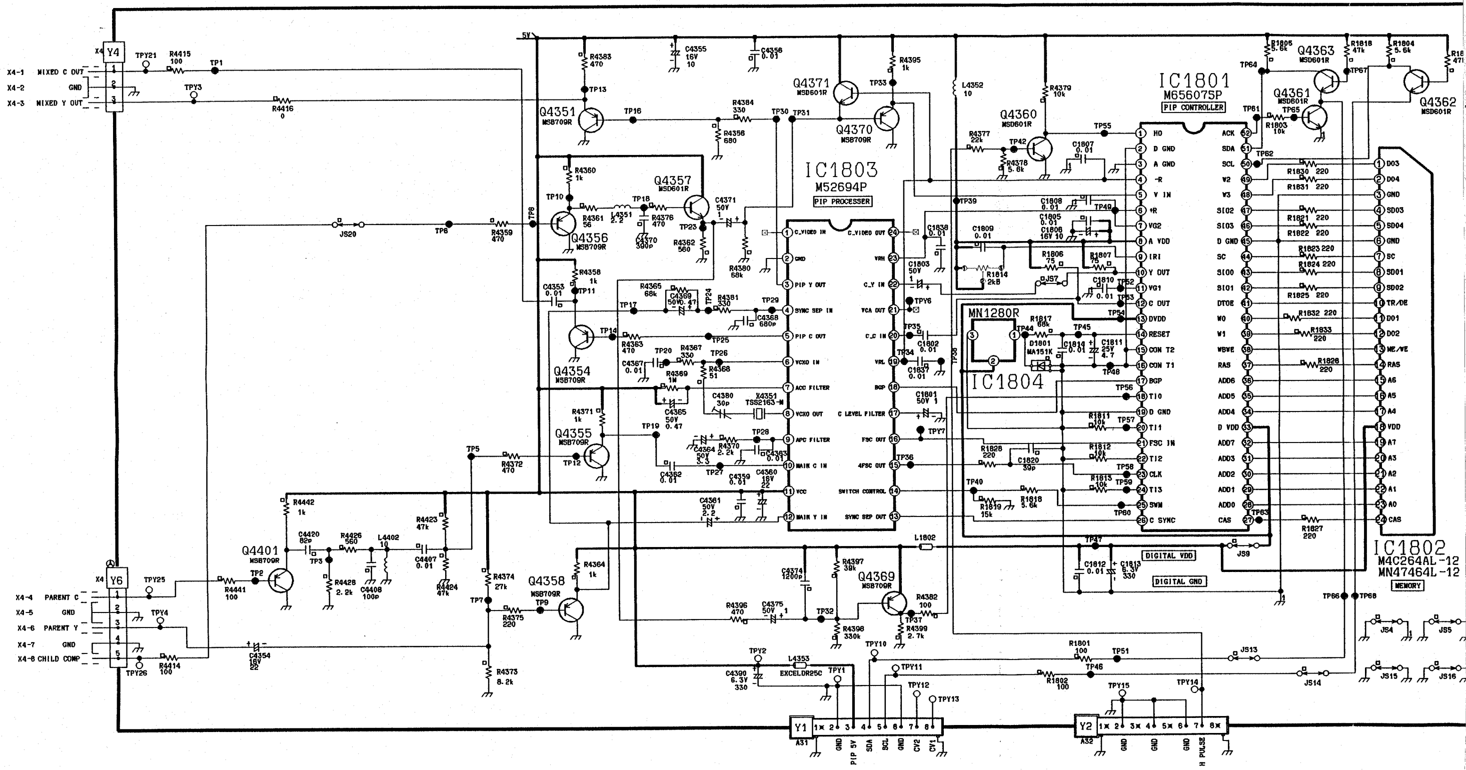
Y–Board Schematic
All Receivers

TNP111804DZ (Y)

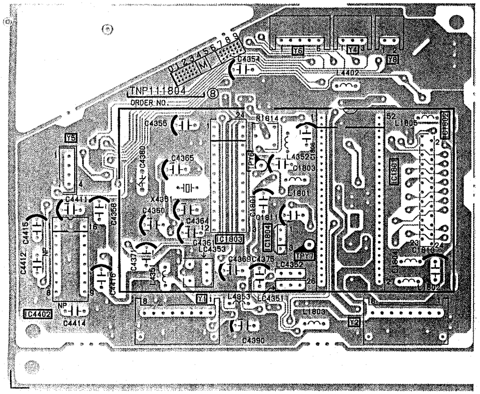
1

2

3


Y4
X4-1 MIXED C OUT
X4-2 GND
X4-3 MIXED Y OUT
TPY21
R4415 100
TP1
TPY3
R4416 0
5V
R4383 470
TP13
C4355 16V 10
C4356 0.01
Q4351 MSB709R
TP16
R4384 330
R4356 680
TP30
TP31
Q4371 MSD601R
TP33
R4395 1k
Q4370 MSB709R
L4352 10
R4379 10k
Q4360 MSD601R
R4377 22k
TP42
R4378 5.6k
C1807 0.01
TP55
IC1801
M656075P
PIP CONTROLLER
R1805 5.6k
Q4363 MSD601R
TP64
R1818 47k
R1804 5.6k
TP67
Q4361 MSD601R
TP65
R1803 10k
TP61
TP62
Q4362 MSD601R
R4360 1k
TP10
R4361 56
L4351 2.2
TP18
R4376 470
Q4357 MSD601R
C4371 50V 1
TP23
C4370 390p
R4362 560
R4380 68k
Q4356 MSB709R
TP8
R4359 470
JS20
IC1803
M52694P
PIP PROCESSOR
C_VIDEO IN
GND
PIP Y OUT
SYNC SEP IN
PIP C OUT
VCXO IN
ACC FILTER
VCXO OUT
APC FILTER
MAIN C IN
VCC
MAIN Y IN
C_VIDEO OUT
VRH
C_Y IN
VCA OUT
C_C IN
VRL
BGP
C LEVEL FILTER
FSC OUT
4FSC OUT
SWITCH CONTROL
SYNC SEP OUT
R4358 1k
TP11
C4353 0.01
R4365 68k
C4369 50V 0.47
TP24
R4381 330
TP29
C4368 680p
TP17
TP14
R4363 470
TP25
Q4354 MSB709R
TP20
R4367 330
TP26
C4367 0.01
R4369 1M
R4368 51
C4380 30p
X4351 TSS2163-M
C4365 50V 0.47
R4371 1k
Q4355 MSB709R
TP19
TP28
C4364 50V 3.3
R4370 2.2k
C4363 0.01
TP12
TP27
C4362 0.01
C4359 0.01
C4360 16V 22
C4361 50V 2.2
TP5
R4372 470
C1838 0.01
C1809 0.01
C1803 50V 1
TPY6
TP35
C1802 0.01
TP34
TP36
C1837 0.01
C1801 50V 1
TPY7
TP39
C1808 0.01
TP49
C1805 0.01
C1806 16V 10
R1806 75
R1807 75
R1814 2.2k
JS7
C1810 0.01
TP52
TP53
TP54
MN1280R
IC1804
R1817 68k
TP44
TP45
D1801 MA151K
C1814 0.01
C1811 25V 4.7
TP48
TP56
R1811 10k
TP57
R1828 220
R1812 10k
C1820 39p
TP58
R1813 10k
TP59
TP40
R1819 15k
R1816 5.6k
TP60
HD
D GND
A GND
-R
V IN
+R
VG2
A VDD
IRI
Y OUT
VG1
C OUT
DVDD
RESET
CON T2
CON T1
BGP
T10
D GND
T11
FSC IN
T12
CLK
T13
SWM
C SYNC
ACK
SDA
SCL
V2
V3
SIO2
SIO3
D GND
SC
SIO0
SIO1
DTOE
WO
W1
WBWE
RAS
ADD6
ADD5
ADD4
D VDD
ADD7
ADD3
ADD2
ADD1
ADD0
CAS
TP63
R1830 220
R1831 220
R1821 220
R1822 220
R1823 220
R1824 220
R1825 220
R1832 220
R1833 220
R1826 220
R1827 220
DO3
DO4
GND
SDO3
SDO4
GND
SC
SDO1
SDO2
TR/DE
DO1
DO2
ME/WE
RAS
A6
A5
A4
VDD
A7
A3
A2
A1
A0
CAS
IC1802
M4C264AL-12
MN47464L-12
MEMORY
L1802
TP47
C1812 0.01
C1813 6.3V 330
DIGITAL VDD
DIGITAL GND
JS9
TP66
TP68
R4442 1k
C4420 82p
R4426 560
L4402 10
R4423 47k
C4407 0.01
Q4401 MSB709R
TP2
TP3
R4428 2.2k
C4408 100p
R4424 47k
R4441 100
Y6
X4-4 PARENT C
X4-5 GND
X4-6 PARENT Y
X4-7 GND
X4-8 CHILD COMP
TPY25
TPY4
TPY26
R4414 100
C4354 16V 22
R4374 27k
TP7
R4375 220
Q4358 MSB709R
TP9
R4364 1k
R4373 8.2k
C4374 1200p
R4397 39k
Q4369 MSB709R
R4382 100
R4396 470
C4375 50V 1
TP32
R4398 330k
TP37
R4399 2.7k
TPY2
L4353 EXCELDR25C
TPY1
C4390 6.3V 330
TPY10
TPY11
TPY12
TPY13
R1801 100
TP51
TP46
R1802 100
TPY15
TPY14
JS13
JS14
JS4
JS5
JS15
JS16
Y1
A31
GND
PIP 5V
SDA
SCL
GND
CV2
CV1
Y2
A32
GND
GND
GND
H PULSE

Note
Voltage levels indicated are for 35" Receivers. 32" Receivers may vary.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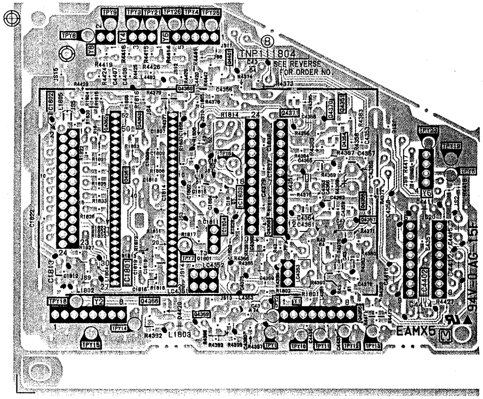
ORDER NO.
C4354
L4402
C4355
R1814
L1806
C4365
X4351
C4360
C4364
IC1803
C4369
C4376
C4411
C4415
C4412
C4402
C4414
C4390
L1803
L1801
L1802
Y1
Y2
Y4
Y5
Y6
Y8
TPY7

4

Y–Board TNP111804
All Receivers


TNP111804
SEE REVERSE
FOR ORDER NO.
TPY9
TPY8
TPY21
TPY20
TPY4
TPY22
TPY6
TPY23
TPY18
TPY14
TPY15
TPY16
TPY11
TPY13
IC1801
IC1802
IC1803
IC1804
IC4402
L1802
L1803
R4392
EAMX5
94V-0

5

Voltage levels indicated are for 35" Receivers. 32" Receivers may vary.

Voltage Measurements – "Y"–Board

IC1801

Pin	Voltage	Pin	Voltage
01	0.55	27	4.20
02	0.00	28	1.96
03	0.00	29	2.36
04	2.51	30	2.74
05	2.96	31	2.91
06	3.73	32	0.51
07	3.73	33	4.96
08	4.97	34	2.91
09	3.74	35	2.91
10	4.59	36	2.40
11	2.07	37	3.87
12	4.56	38	3.94
13	4.95	39	4.00
14	4.92	40	4.00
15	0.00	41	4.95
16	0.00	42	0.38
17	0.20	43	0.36
18	0.37	44	0.01
19	0.00	45	0.00
20	4.93	46	0.35
21	1.91	47	0.40
22	0.01	48	0.89
23	1.72	49	0.42
24	0.01	50	4.12
25	0.01	51	4.07
26	1.05	52	0.03

IC1804

Pin	Voltage
01	4.95
02	4.95
03	0.00

IC1802

Pin	Voltage	Pin	Voltage
01	0.41	13	3.94
02	0.56	14	3.87
03	0.00	15	2.40
04	0.42	16	2.91
05	0.36	17	2.91
06	0.00	18	4.95
07	0.01	19	0.51
08	0.36	20	2.91
09	0.36	21	2.74
10	4.95	22	2.36
11	3.90	23	1.96
12	4.30	24	4.19

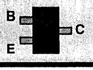
IC1803

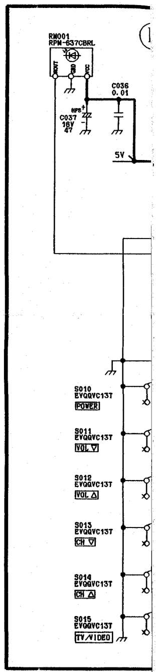
Pin	Voltage	Pin	Voltage
01	N.C	13	1.04
02	0.00	14	0.03
03	1.76	15	1.63
04	3.11	16	1.91
05	1.36	17	2.45
06	3.40	18	0.20
07	4.22	19	2.51
08	2.78	20	2.51
09	2.45	21	N.C
10	2.89	22	3.39
11	4.99	23	3.73
12	3.33	24	N.C

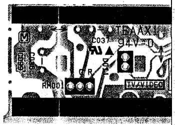
	Q4351	Q4354	Q4355	Q4356	Q4357	Q4358	Q4360	Q4361	Q4362
B	1.19	1.37	2.65	3.12	3.72	1.23	0.55	0.01	4.20
C	0.00	0.00	0.00	0.00	4.99	0.00	0.54	4.24	4.12
E	1.87	2.03	3.30	3.72	3.06	1.89	0.00	0.00	4.28

	Q4363	Q4369	Q4370	Q4371	Q4401
B	4.17	4.65	2.31	2.50	3.17
C	4.07	0.37	0.00	4.99	0.00
E	4.23	4.99	2.96	2.31	3.77

CHIP TRANSISTOR LEAD DESIGNATION




RM001
RPM-637CBRL
C036
0.01
C037
16V
47
5V
S010
EVQQVC13T
POWER
S011
EVQQVC13T
VOL ▽
S012
EVQQVC13T
VOL △
S013
EVQQVC13T
CH ▽
S014
EVQQVC13T
CH △
S015
EVQQVC13T
TV/VIDEO

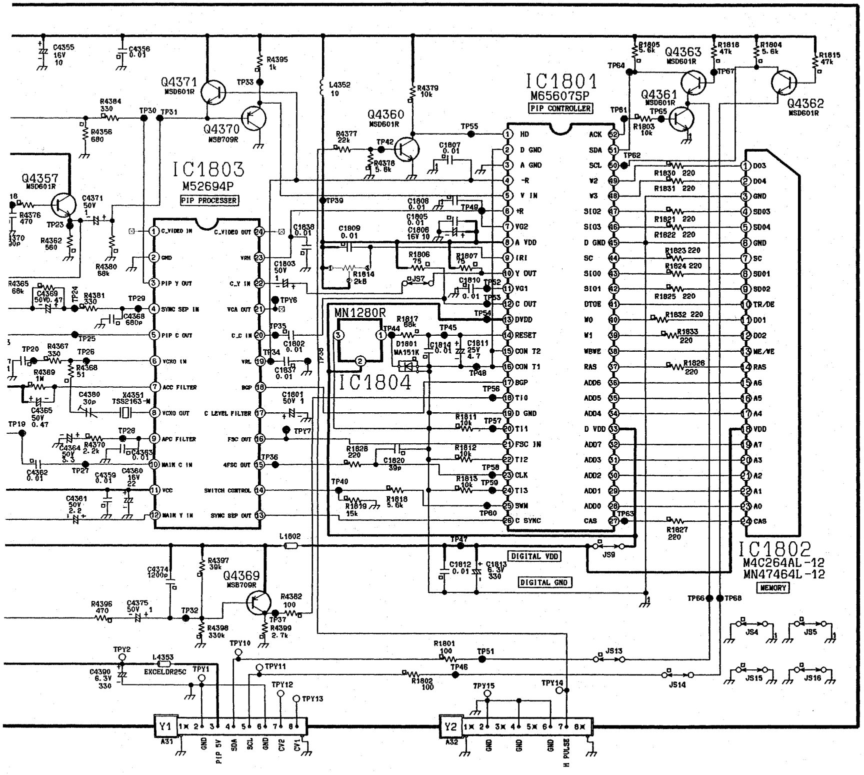

RM001
C037
94V-0
TV/VIDEO

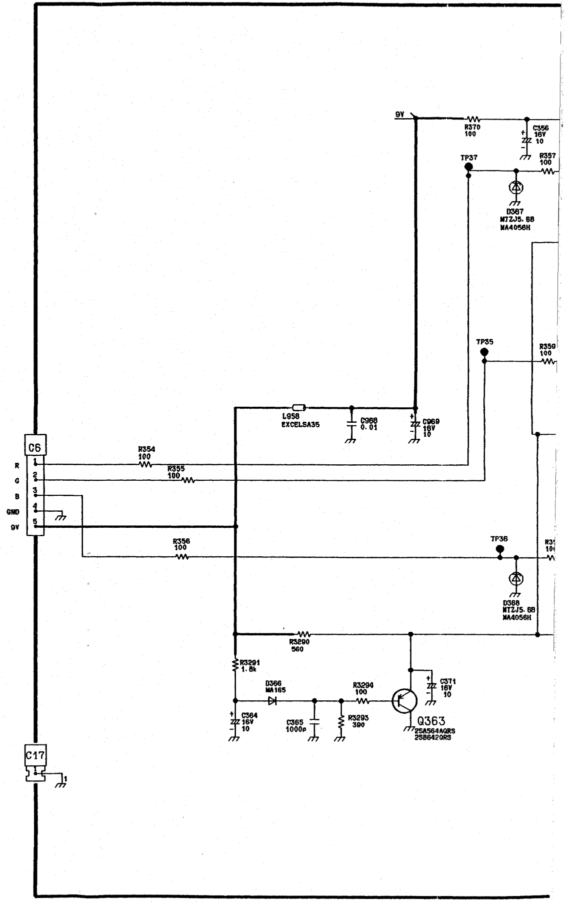
C D E F

C–

Board Schematic
All Receivers

TNP111804DZ (Y)


IC1801
M656075P
PIP CONTROLLER
IC1803
M52694P
PIP PROCESSER
IC1802
M4C264AL-12
MN47464L-12
MEMORY
IC1804
MN1280R
Q4371 MSD601R
Q4370 MSB709R
Q4360 MSD601R
Q4357 MSD601R
Q4363 MSD601R
Q4361 MSD601R
Q4362 MSD601R
Q4369 MSB709R
L4352 10
L1802
L4353 EXCELDR25C
X4351 TSS2165-M
D1801 MA151K
DIGITAL VDD
DIGITAL GND
HD
D GND
A GND
-R
V IN
+R
VG2
A VDD
IRI
Y OUT
VG1
C OUT
DVDD
RESET
CON T2
CON T1
BGP
T10
D GND
T11
FSC IN
T12
CLK
T13
SWM
C SYNC
ACK
SDA
SCL
V2
V3
SI02
SI03
D GND
SC
SI00
SI01
DTOE
W0
W1
WBWE
RAS
ADD6
ADD5
ADD4
D VDD
ADD7
ADD3
ADD2
ADD1
ADD0
CAS
C_VIDEO IN
GND
PIP Y OUT
SYNC SEP IN
PIP C OUT
VCXO IN
ACC FILTER
VCXO OUT
APC FILTER
MAIN C IN
VCC
MAIN Y IN
C_VIDEO OUT
VRH
C_Y IN
VCA OUT
C_C IN
VRL
BGP
C LEVEL FILTER
FSC OUT
4FSC OUT
SWITCH CONTROL
SYNC SEP OUT
D03
D04
GND
SD03
SD04
GND
SC
SD01
SD02
TR/OE
DO1
DO2
ME/WE
RAS
A6
A5
A4
VDD
A7
A3
A2
A1
A0
CAS
Y1
A31
GND
PIP 5V
SDA
SCL
GND
CV2
CV1
Y2
A32
GND
GND
GND
H PULSE
JS4
JS5
JS9
JS13
JS14
JS15
JS16
JS7
TP64
TP67
TP61
TP65
TP62
TP55
TP42
TP33
TP30
TP31
TP39
TP49
TP52
TP53
TP54
TP45
TP44
TP48
TP56
TP57
TP58
TP59
TP60
TP40
TP63
TP47
TP51
TP46
TP66
TP68
TPY1
TPY2
TPY6
TPY7
TPY10
TPY11
TPY12
TPY13
TPY14
TPY15
R1801 100
R1802 100
R1803 10k
R1804 5.6k
R1805 5.6k
R1815 47k
R1816 47k
R4395 1k
R4379 10k
R4384 330
R4356 680
R4377 22k
R4378 5.6k
R4376 470
R4362 560
R4380 68k
R4365 68k
R4381 330
R4367 330
R4368 51
R4369 1M
R4370 2.2k
R4396 470
R4397 39k
R4398 330k
R4399 2.7k
R4382 100
R1806 75
R1807 75
R1814 2k8
R1817 68k
R1811 10k
R1812 10k
R1813 10k
R1828 220
R1818 5.6k
R1819 15k
R1830 220
R1831 220
R1821 220
R1822 220
R1823 220
R1824 220
R1825 220
R1832 220
R1833 220
R1826 220
R1827 220
C4355 16V 10
C4356 0.01
C4371 50V 1
C4369 50V 0.47
C4368 680p
C4380 30p
C4365 50V 0.47
C4364 50V 3.3
C4362 0.01
C4363 0.01
C4359 0.01
C4360 16V 22
C4361 50V 2.2
C4374 1200p
C4375 50V 1
C4390 6.3V 330
C1807 0.01
C1808 0.01
C1805 0.01
C1806 16V 10
C1809 0.01
C1838 0.01
C1803 50V 1
C1810 0.01
C1802 0.01
C1837 0.01
C1801 50V 1
C1814 0.01
C1811 25V 4.7
C1820 39p
C1812 0.01
C1813 6.3V 330


9V
R370 100
C356 16V 10
TP37
R357 100
D367 MTZJ5.68 MA4056H
TP35
R359 100
L958 EXCELSA35
C968 0.01
C969 16V 10
C6
R
G
B
GND
9V
R354 100
R355 100
R356 100
TP36
D368 MTZJ5.68 MA4056H
R3290 560
R3291 1.8k
D366 MA165
R3294 100
C371 16V 10
C364 16V 10
C365 1000p
R3293 390
Q363 2SA564AQRS 2SB642QRS
C17

Note
Voltage levels indicated are for 35" Receivers. 32" Receivers

L–Board Schematic
35" Receivers

Note
Voltage levels indicated are for 35" Receivers. 32" Receivers may vary.

Voltage Measurements – "Y"–Board

IC1801

	0.55	27	4.20
	0.00	28	1.96
	0.00	29	2.36
	2.51	30	2.74
	2.96	31	2.91
	3.73	32	0.51
	3.73	33	4.96
	4.97	34	2.91
	3.74	35	2.91
	4.59	36	2.40
	2.07	37	3.87
	4.56	38	3.94
	4.95	39	4.00
	4.92	40	4.00
	0.00	41	4.95
	0.00	42	0.38
	0.20	43	0.36
	0.37	44	0.01
	0.00	45	0.00
	4.93	46	0.35
	1.91	47	0.40
	0.01	48	0.89
	1.72	49	0.42
	0.01	50	4.12
	0.01	51	4.07
	1.05	52	0.03

IC1802

01	0.41	13	3.94
02	0.56	14	3.87
03	0.00	15	2.40
04	0.42	16	2.91
05	0.36	17	2.91
06	0.00	18	4.95
07	0.01	19	0.51
08	0.36	20	2.91
09	0.36	21	2.74
10	4.95	22	2.36
11	3.90	23	1.96
12	4.30	24	4.19

IC1803

01	N.C	13	1.04
02	0.00	14	0.03
03	1.76	15	1.63
04	3.11	16	1.91
05	1.36	17	2.45
06	3.40	18	0.20
07	4.22	19	2.51
08	2.78	20	2.51
09	2.45	21	N.C
10	2.89	22	3.39
11	4.99	23	3.73
12	3.33	24	N.C

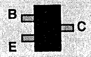
IC1804

01	4.95
02	4.95
03	0.00

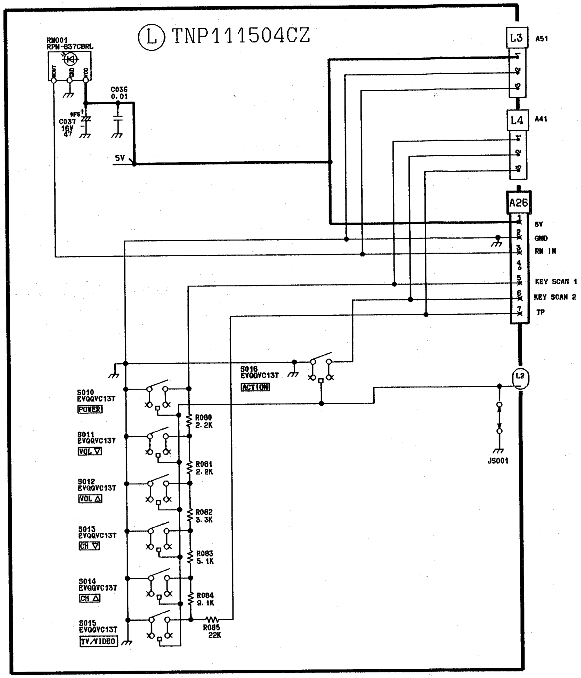
Q4351	Q4354	Q4355	Q4356	Q4357	Q4358	Q4360	Q4361	Q4362
1.19	1.37	2.65	3.12	3.72	1.23	0.55	0.01	4.20
0.00	0.00	0.00	0.00	4.99	0.00	0.54	4.24	4.12
1.87	2.03	3.30	3.72	3.06	1.89	0.00	0.00	4.28

Q4363	Q4369	Q4370	Q4371	Q4401
4.17	4.65	2.31	2.50	3.17
4.07	0.37	0.00	4.99	0.00
4.23	4.99	2.96	2.31	3.77

CHIP TRANSISTOR LEAD DESIGNATION



L–Board Schematic 35" Receivers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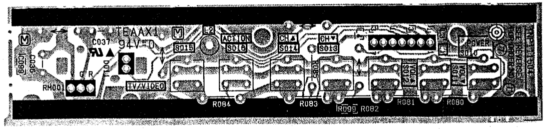
RM001
RPM-637CBRL
C036
0.01
C037
16V
47
5V
L3
A51
L4
A41
A26
5V
GND
RM IN
KEY SCAN 1
KEY SCAN 2
TP
L2
S016
EVQQVC13T
ACTION
S010
EVQQVC13T
POWER
S011
EVQQVC13T
VOL ▽
S012
EVQQVC13T
VOL △
S013
EVQQVC13T
CH ▽
S014
EVQQVC13T
CH △
S015
EVQQVC13T
TV/VIDEO
R080
2.2K
R081
2.2K
R082
3.3K
R083
5.1K
R084
9.1K
R085
22K
JS001

L–Board TNP111504 35" Receivers


C037
RM001
TV/VIDEO
S015
ACTION
S016
CH▲
S014
CH▼
S013
POWER
R084
R083
R082
R081
R080
L2

Voltage Measurer "C"–Board

	Q351	Q352	Q353
B	8.79	8.80	8.80
C	161.6	160.4	155.8
E	8.30	8.29	8.30

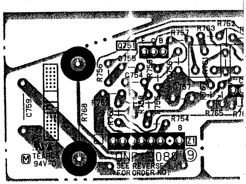
	Q355	Q356	Q363
B	2.75	2.85	1.49
C	8.29	8.30	0.00
E	2.35	2.45	2.20

IMPORTANT SAFETY NO
THIS SCHEMATIC DIAGRAM INCORPORATE
FEATURES THAT ARE IMPORTANT FOR PROTEC
X-RADIATION, FIRE AND ELECTRICAL SHOC
WHEN SERVICING IT IS ESSENTIAL T
MANUFACTURERS SPECIFIED PARTS BE USE
CRITICAL COMPONENTS DESIGNATED WITH A
SCHEMATIC.

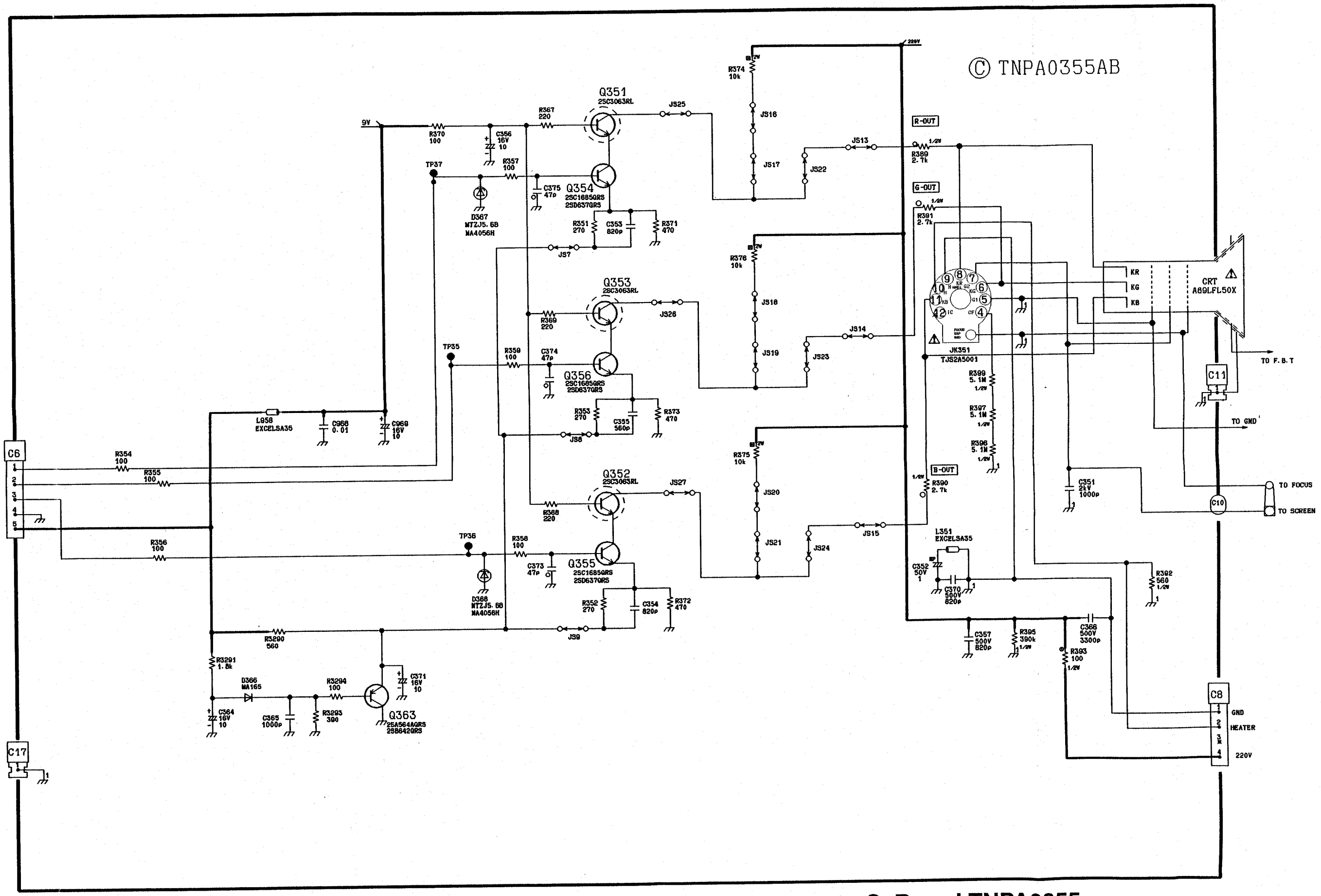
Voltage Measureme "Z"–Board

	Q751	Q752
B	3.55	8.79
C	8.24	0.58
E	2.93	9.42

Z–Board 0NP1908 All Receivers


Q751
R757
R763
R756
C755
C759
R768
R754
R765
Z1
SEE REVERSE
FOR ORDER NO.

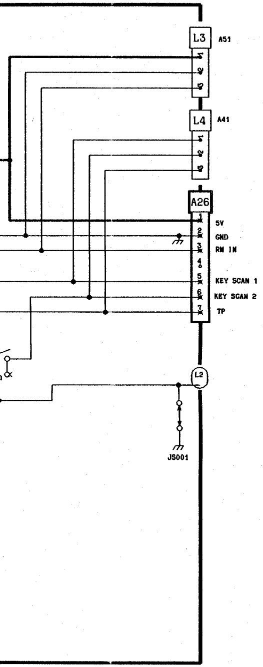
C–Board Schematic
35" Receivers


© TNPA0355AB
9V
R370 100
C356 16V 10
R367 220
Q351 2SC3063RL
JS25
TP37
R357 100
C375 47p
Q354 2SC1685QRS 2SD637QRS
D367 MTZJ5.6B MA4056H
R351 270
C353 820p
R371 470
JS7
Q353 2SC3063RL
R369 220
JS26
TP35
R359 100
C374 47p
Q356 2SC1685QRS 2SD637QRS
R353 270
C355 560p
R373 470
JS8
L858 EXCELSA35
C968 0.01
C969 16V 10
C6
R
G
B
GND
9V
R354 100
R355 100
R356 100
Q352 2SC3063RL
R368 220
JS27
TP36
R358 100
C373 47p
Q355 2SC1685QRS 2SD637QRS
D368 MTZJ5.6B MA4056H
R352 270
C354 820p
R372 470
JS9
R3290 560
R3291 1.8k
D366 MA165
R3294 100
C371 16V 10
C364 16V 10
C365 1000p
R3293 390
Q363 2SA564AQRS 2SB642QRS
C17
220V
R374 10k
JS16
JS17
JS22
JS13
R-OUT
R389 2.7k 1/2W
G-OUT
R391 2.7k 1/2W
R376 10k
JS18
JS19
JS23
JS14
R375 10k
JS20
JS21
JS24
JS15
B-OUT
R390 2.7k 1/2W
JK351 TJS2A5001
FOCUS GAP
R399 5.1M 1/2W
R397 5.1M 1/2W
R396 5.1M 1/2W
L351 EXCELSA35
C352 50V 1
C370 500V 820p
C357 500V 820p
R395 390k 1/2W
C366 500V 3300p
R393 100 1/2W
R392 560 1/2W
C351 2kV 1000p
KR
KG
KB
CRT A89LFL50X
TO F.B.T
C11
TO GND
TO FOCUS
TO SCREEN
C10
C8
GND
HEATER
220V

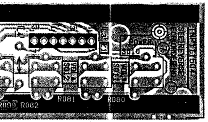
ematic
ers

C–Board TNPA0355
35" Receivers

matic
ers


L3
A51
L4
A41
A26
5V
GND
RM IN
KEY SCAN 1
KEY SCAN 2
TP
L2
J5001

1504
rs


R081
R080
R082
SEE REVERSE

Voltage Measurements "C"–Board

	Q351	Q352	Q353	Q354
B	8.79	8.80	8.80	2.74
C	161.6	160.4	155.8	8.30
E	8.30	8.29	8.30	2.37

	Q355	Q356	Q363
B	2.75	2.85	1.49
C	8.29	8.30	0.00
E	2.35	2.45	2.20

IMPORTANT SAFETY NOTICE

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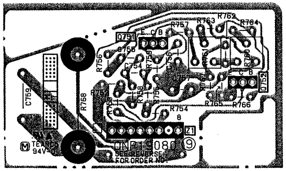
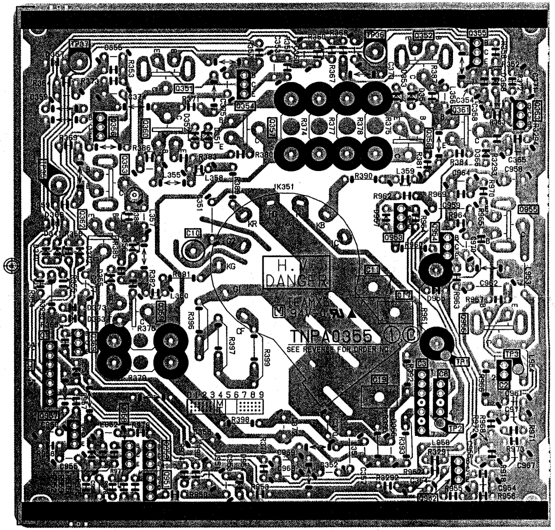
Voltage Measurements "Z"–Board

	Q751	Q752
B	3.55	8.79
C	8.24	0.58
E	2.93	9.42

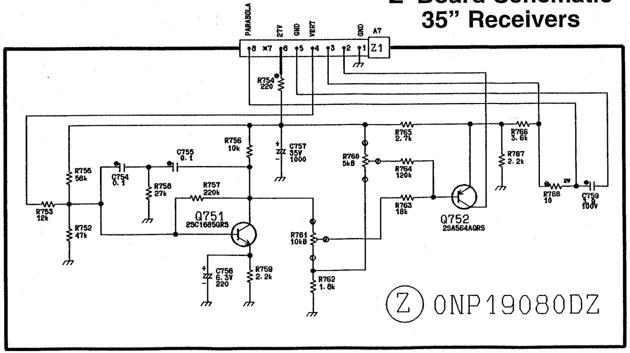
Z–Board 0NP19080 All Receivers


Q751
Q752
R757
R763
R762
R764
R756
C759
R768
R754
R765
R766
Z1
0NP19080
SEE REVERSE FOR ORDER NO.
94V

C–Board TNPA0355 35" Receivers


TP37
TP36
Q351
Q352
Q354
Q355
Q356
Q361
Q363
R374
R377
R378
R375
R390
L359
IK351
KR
KB
KG
C10
C11
C12
C13
C8
C9
H.V. DANGER
TNPA0355
SEE REVERSE FOR ORDER NO.
1 2 3 4 5 6 7 8 9
TP1
TP2
TP3
R398
R396
R397
R399
R379
R376
L350
L355
L358
R352
R350
C954
R956

Z–Board Schematic 35" Receivers

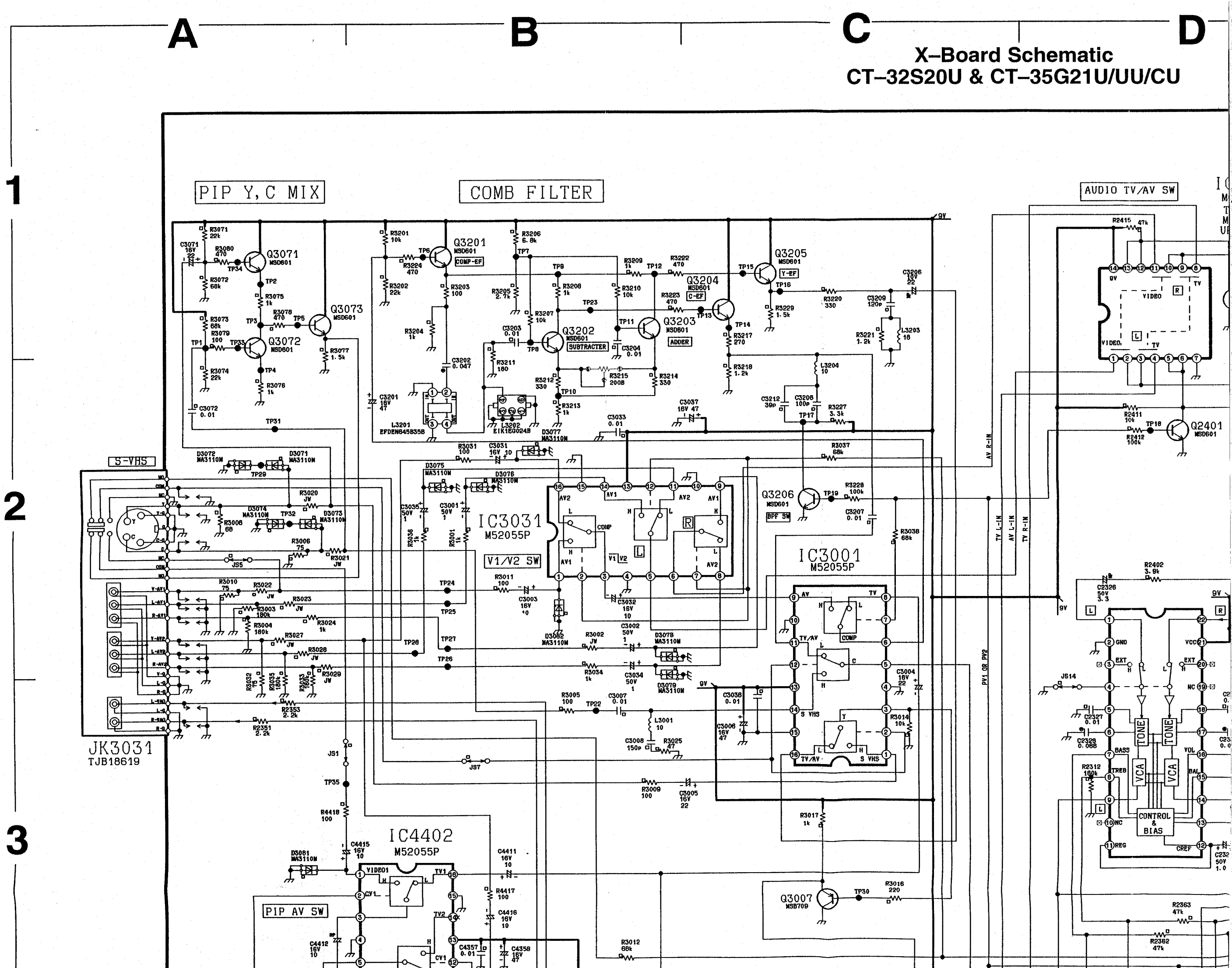

PARABOLA
27V
GND
VERT
GND
A7
Z1
8
X7
6
5
4
3
2
1
R754 220
R756 10k
C757 35V 1000
C755 0.1
C754 0.1
R755 56k
R758 27k
R757 220k
R753 12k
R752 47k
Q751 2SC1685QRS
C756 6.3V 220
R759 2.2k
R761 10kB
R762 1.8k
R760 5kB
R765 2.7k
R764 120k
R763 18k
Q752 2SA564AQRS
R766 3.6k
R767 2.2k
R768 10
2W
C759 3.9 100V
Z 0NP19080DZ

MTC960635A1

Sheet 3 of 4
Side B

Y-Board Schematic -
All Receivers;
C, R & Z Boards Schematic,
Layout & Voltages – 32" Receivers

X–Board Schematic
CT–32S20U & CT–35G21U/UU/CU


A
B
C
D
1
2
3
PIP Y,C MIX
COMB FILTER
AUDIO TV/AV SW
Q3071
MSD601
Q3072
MSD601
Q3073
MSD601
Q3201
MSD601
COMP-EF
Q3202
MSD601
SUBTRACTER
Q3203
MSD601
ADDER
Q3204
MSD601
C-EF
Q3205
MSD601
Y-EF
Q3206
MSD601
BPF SW
Q2401
MSD601
Q3007
MSB709
L3201
EFDEN645B35B
L3202
EIK1EG024B
S-VHS
JK3031
TJB18619
IC3031
M52055P
V1/V2 SW
IC3001
M52055P
IC4402
M52055P
PIP AV SW
VIDEO1
CV1
TV1
TV2
AV2
AV1
COMP
TV/AV
S VHS
VIDEO
TV
JS1
JS5
JS7
JS14
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
TP11
TP12
TP13
TP14
TP15
TP16
TP17
TP18
TP19
TP22
TP23
TP24
TP25
TP26
TP27
TP28
TP29
TP30
TP31
TP32
TP33
TP34
TP35
9V
TV R-IN
TV L-IN
AV L-IN
AV R-IN
PV1 OR PV2
GND
EXT
NC
BASS
TREB
REG
VCC
VOL
BAL
CREF
TONE
VCA
CONTROL & BIAS
R2415 47k
R2411 10k
R2412 100k
R2402 3.9k
R2312 180k
R2363 47k
R2362 47k
C2326 50V 3.3
C2327 0.01
C2328 0.068
R3071 22k
R3080 470
R3072 68k
R3075 1k
R3078 470
R3073 68k
R3079 100
R3074 22k
R3076 1k
R3077 1.5k
C3071 16V 22
C3072 0.01
R3201 10k
R3224 470
R3202 22k
R3203 100
R3204 1k
C3202 0.047
C3201 16V 47
R3206 6.8k
R3205 2.7k
R3207 10k
C3203 0.01
R3211 180
R3212 330
R3213 1k
R3208 1k
R3209 1k
R3210 10k
C3204 0.01
R3215 200B
R3214 330
R3222 470
R3223 470
R3217 270
R3218 1.2k
R3229 1.5k
R3220 330
C3209 120p
C3206 16V 22
R3221 1.2k
L3203 18
L3204 10
C3212 39p
C3208 100p
R3227 3.3k
R3037 68k
R3228 100k
C3207 0.01
R3038 68k
C3037 16V 47
C3033 0.01
D3077 MA3110M
D3072 MA3110M
D3071 MA3110M
D3075 MA3110M
D3076 MA3110M
D3074 MA3110M
D3073 MA3110M
D3082 MA3110M
D3078 MA3110M
D3079 MA3110M
D3081 MA3110M
R3031 100
C3031 16V 10
C3035 50V 1
C3001 50V 1
R3036 1k
R3001 1k
R3020 JW
R3006 68
R3006 75
R3021 JW
R3010 75
R3022 JW
R3023 JW
R3003 180k
R3004 180k
R3024 1k
R3027 JW
R3028 JW
R3029 JW
R3032 75
R3035 180k
R3033 180k
R2353 2.2k
R2351 2.2k
R3011 100
C3003 16V 10
C3032 16V 10
R3002 JW
C3002 50V 1
R3034 1k
C3034 50V 1
R3005 100
C3007 0.01
L3001 10
C3008 150p
R3025 47
C3038 0.01
C3006 16V 47
C3004 16V 22
R3014 10k
R3009 100
C3005 16V 22
R3017 1k
R3016 220
R3012 68k
R4418 100
C4415 16V 10
C4411 16V 10
R4417 100
C4416 16V 10
C4412 16V 10
C4357 0.01
C4358 16V
635A1

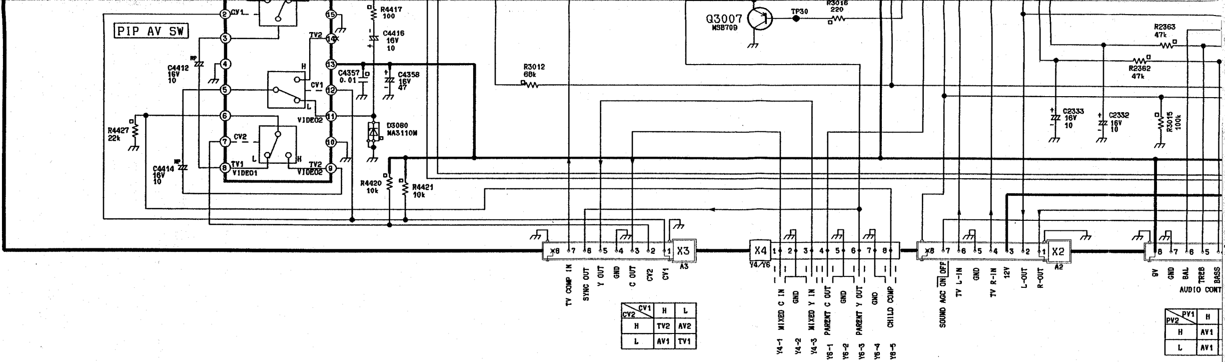
C, R & Z Boards
Schematic & Layout – 32" Receivers;
X–Board Schematic & Layout CT–32S20U & CT–35G21U/UU/CU

Sheet 4 of 4
Side A

MTC9606635A1

4

5


PIP AV SW
CV1
CV2
TV1
TV2
VIDEO1
VIDEO2
C4412 16V 10
C4414 16V 10
R4427 22k
R4417 100
C4416 16V 10
C4357 0.01
C4358 16V 47
D3080 MA3110M
R4420 10k
R4421 10k
Q3007 MSB709
TP30
R3016 220
R3012 68k
R2363 47k
R2362 47k
C2333 16V 10
C2332 16V 10
R3015 100k
X3
A3
TV COMP IN
SYNC OUT
Y OUT
GND
C OUT
CV2
CV1
X4
Y4/Y6
MIXED C IN
GND
MIXED Y IN
PARENT C OUT
GND
PARENT Y OUT
GND
CHILD COMP
Y4-1
Y4-2
Y4-3
Y6-1
Y6-2
Y6-3
Y6-4
Y6-5
X2
A2
SOUND AGC ON OFF
TV L-IN
GND
TV R-IN
12V
L-OUT
R-OUT
9V
GND
BAL
TREB
BASS
AUDIO CONT
CV2 \ CV1 | H | L
H | TV2 | AV2
L | AV1 | TV1
PV2 \ PV1 | H
H | AV1
L | AV1

IMPORTANT SAFETY NOT

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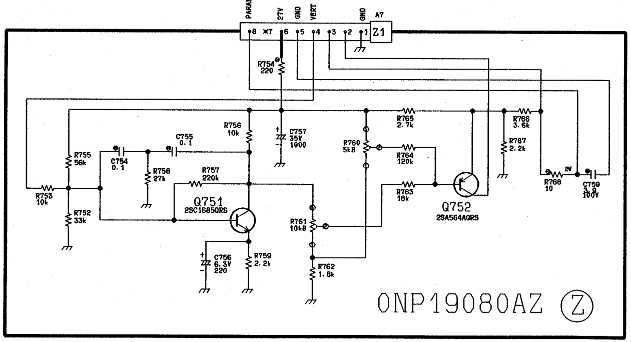
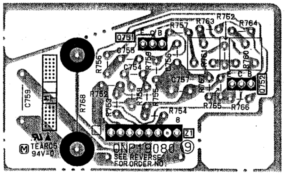
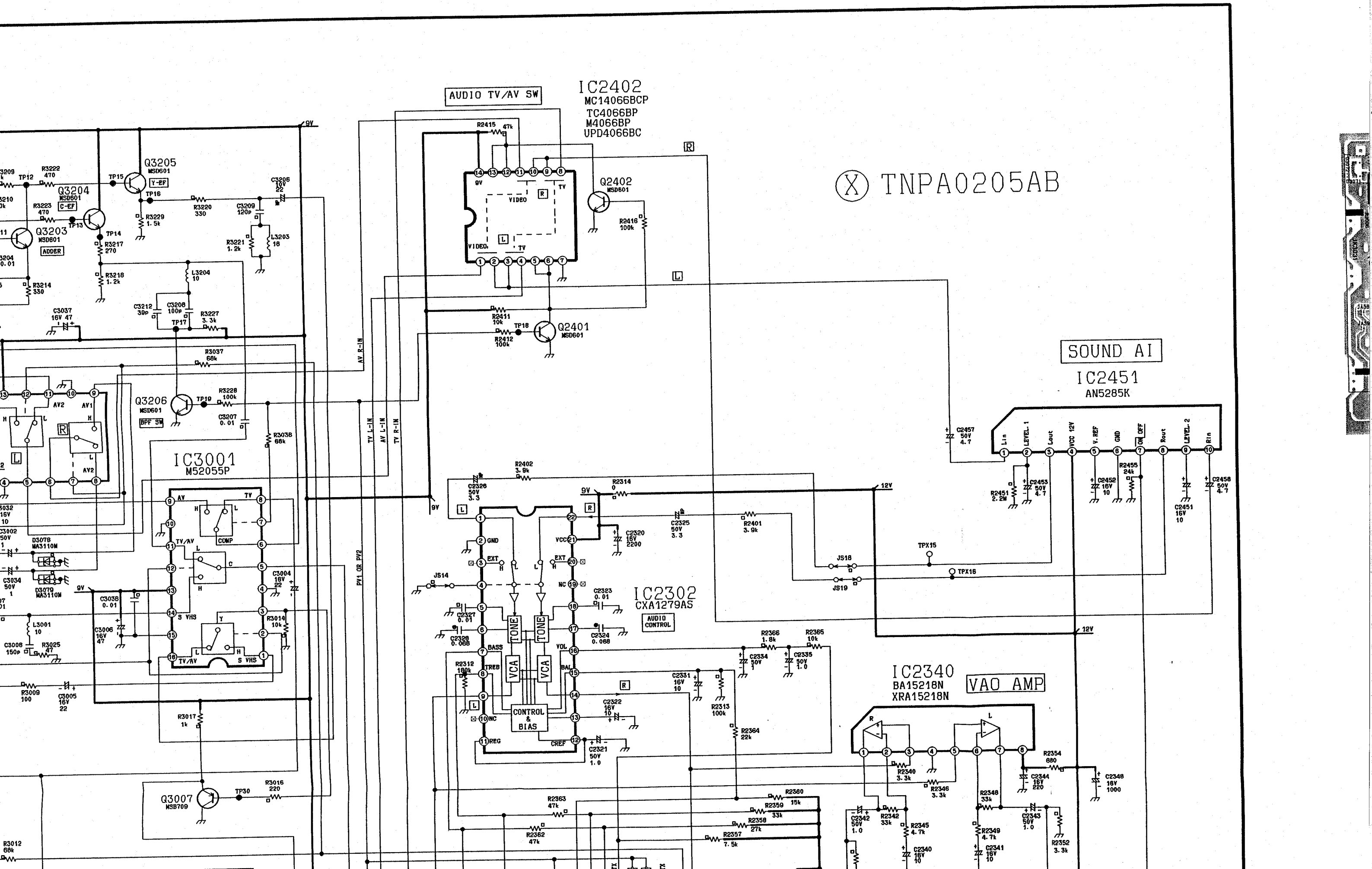
Z–Board Schematic
32" Receivers

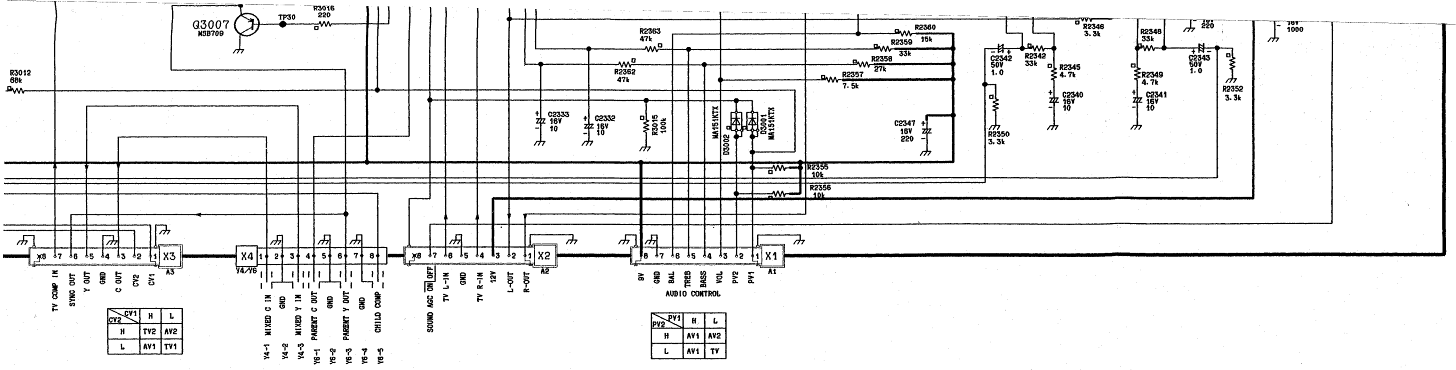

PARABOLA
27V
GND
VERT
GND
A7
Z1
R754 220
C757 35V 1000
R756 10k
C755 0.1
C754 0.1
R755 56k
R758 27k
R757 220k
R753 10k
R752 33k
Q751 2SC1685QRS
C756 6.3V 220
R759 2.2k
R760 5kB
R761 10kB
R762 1.8k
R765 2.7k
R764 120k
R763 18k
Q752 2SA564AQRS
R766 3.6k
R767 2.2k
R768 10
2W
C759 3.3 100V
0NP19080AZ
Z

Z–Board 0NP19080
All Receivers


R757
R763
R752
R764
Q751
R756
C756
C754
R759
C755
R761
R760
C757
Q752
C759
R768
R753
R758
R755
R765
R766
R754
Z1
TEARCO 94V-0
0NP19080
SEE REVERSE FOR ORDER NO.

X–Board Schematic
CT–32S20U & CT–35G21U/UU/CU


AUDIO TV/AV SW
IC2402
MC14066BCP
TC4066BP
M4066BP
UPD4066BC
Q2402
MSD601
Q2401
MSD601
Ⓧ TNPA0205AB
SOUND AI
IC2451
AN5285K
L in
LEVEL 1
L out
VCC 12V
V. REF
GND
ON OFF
R out
LEVEL 2
R in
12V
Q3205
MSD601
Y-EF
Q3204
MSD601
C-EF
Q3203
MSD601
ADDER
Q3206
MSD601
BPF SW
IC3001
M52055P
AV
TV
COMP
TV/AV
S VHS
Q3007
MSB709
D3078
MA3110M
D3079
MA3110M
AV R-IN
TV L-IN
AV L-IN
TV R-IN
PV1 OR PV2
9V
IC2302
CXA1279AS
AUDIO CONTROL
GND
EXT
NC
VCC
TONE
VCA
CONTROL & BIAS
BASS
TREB
VOL
BAL
REG
CREF
JS14
JS18
JS19
TPX15
TPX16
IC2340
BA15218N
XRA15218N
VAO AMP
R2415 47k
R2416 100k
R2411 10k
R2412 100k
R2402 3.9k
R2314 0
R2401 3.9k
C2326 50V 3.3
C2320 16V 2200
C2325 50V 3.3
C2457 50V 4.7
R2451 2.2M
C2453 50V 4.7
C2452 16V 10
R2455 24k
C2451 16V 10
C2458 50V 4.7
C2323 0.01
C2324 0.068
C2327 0.01
C2328 0.068
R2312 180k
C2322 16V 10
C2321 50V 1.0
R2366 1.8k
R2365 10k
C2334 50V 1
C2335 50V 1.0
C2331 16V 10
R2313 100k
R2364 22k
R2354 680
C2344 16V 220
C2348 16V 1000
R2340 3.3k
R2346 3.3k
R2348 33k
R2360 15k
R2359 33k
R2358 27k
R2357 7.5k
R2363 47k
R2362 47k
C2342 50V 1.0
R2342 33k
R2345 4.7k
C2340 16V 10
C2343 50V 1.0
R2349 4.7k
C2341 16V 10
R2352 3.3k
R3222 470
R3223 470
R3220 330
R3229 1.5k
R3217 270
R3218 1.2k
R3214 330
C3206 10V 22
C3209 120p
R3221 1.2k
L3203 18
L3204 10
C3212 39p
C3208 100p
R3227 3.3k
C3037 16V 47
R3037 68k
R3228 100k
C3207 0.01
R3038 68k
C3004 16V 22
R3014 10k
C3036 0.01
C3006 16V 47
L3001 10
C3008 150p
R3025 47
R3009 100
C3005 16V 22
R3017 1k
R3016 220
R3012 68k
TP12
TP13
TP14
TP15
TP16
TP17
TP18
TP19
TP30



Q3007
M5B709
TP30
R3016
220
R3012
68k
R2363
47k
R2362
47k
R2360
15k
R2359
33k
R2358
27k
R2357
7.5k
R2346
3.3k
R2342
33k
R2345
4.7k
R2348
33k
R2349
4.7k
R2352
3.3k
R2350
3.3k
C2342
50V
1.0
C2343
50V
1.0
C2340
16V
10
C2341
16V
10
C2347
16V
220
C2333
16V
10
C2332
16V
10
R3015
100k
D3002
MA151KTX
D3001
MA151KTX
R2355
10k
R2356
10k
X3
A3
X4
Y4/Y6
X2
A2
X1
A1
TV COMP IN
SYNC OUT
Y OUT
GND
C OUT
CV2
CV1
Y4-1
MIXED C IN
Y4-2
GND
Y4-3
MIXED Y IN
Y6-1
PARENT C OUT
Y6-2
GND
Y6-3
PARENT Y OUT
Y6-4
GND
Y6-5
CHILD COMP
SOUND AGC
ON
OFF
TV L-IN
GND
TV R-IN
12V
L-OUT
R-OUT
9V
GND
BAL
TREB
BASS
VOL
PV2
PV1
AUDIO CONTROL

CV2 \ CV1	H	L
H	TV2	AV2
L	AV1	TV1

PV2 \ PV1	H	L
H	AV1	AV2
L	AV1	TV

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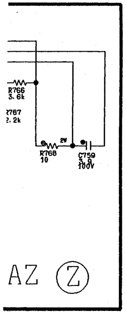
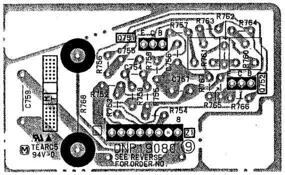


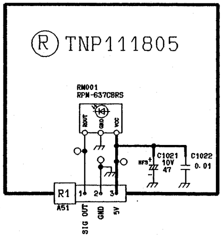
R766
3.6k
R767
2.2k
R768
10
2W
C759
3.3
100V
AZ
Z

Z–Board 0NP19080
All Receivers



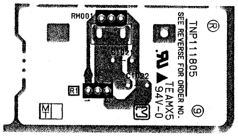
Q751
Q752
R756
C755
C754
R757
R763
R762
R764
R758
R768
R766
R765
R754
C759
Z1
0NP19080
SEE REVERSE FOR ORDER NO.
TEARC5
94V-0

R–Board Schematic
CT–32S20U

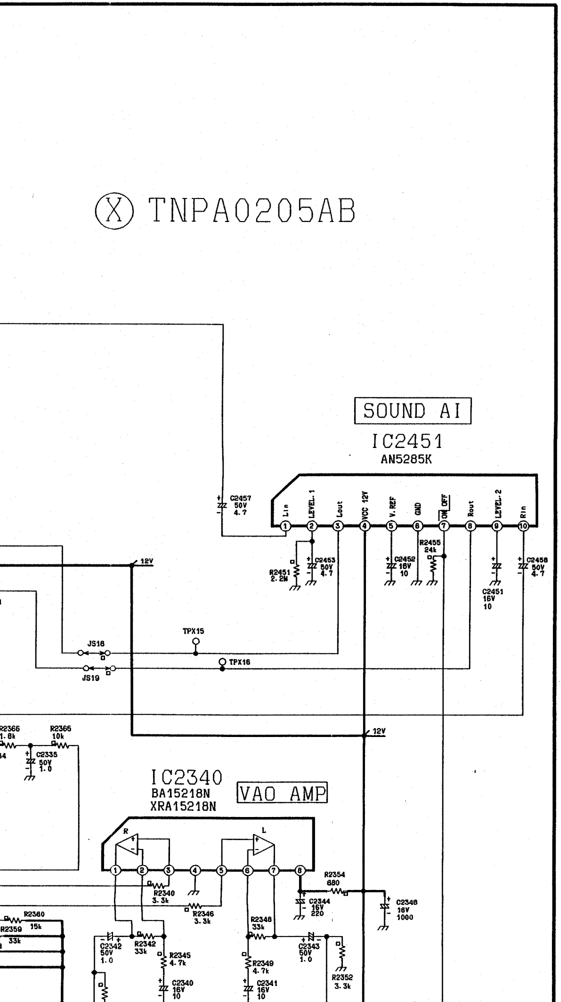


R TNP111805
RM001
RPM-637CBRS
ROUT
GND
VCC
C1021
10V
47
C1022
0.01
R1
A51
SIG OUT
GND
5V

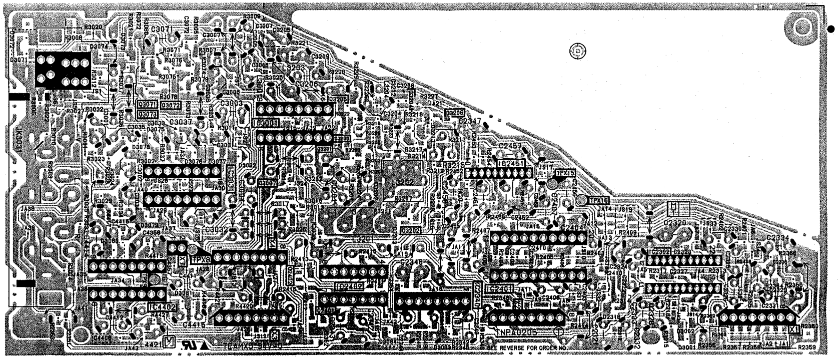
R–Board TNP111805
32" Receivers



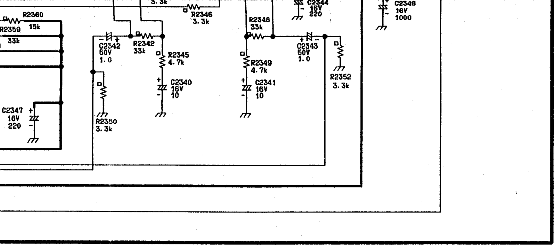
RM001
R1
TNP111805
SEE REVERSE FOR ORDER NO.
TEAMX5
94V-0


Ⓧ TNPA0205AB
SOUND AI
IC2451
AN5285K
Lin
LEVEL 1
Lout
VCC 12V
V.REF
GND
ON OFF
Rout
LEVEL 2
Rin
C2457 50V 4.7
R2451 2.2M
C2453 50V 4.7
C2452 16V 10
R2455 24k
C2451 16V 10
C2458 50V 4.7
12V
TPX15
JS18
TPX16
JS19
R2366 1.8k
R2365 10k
C2335 50V 1.0
12V
IC2340
BA15218N
XRA15218N
VAO AMP
R
L
R2354 680
R2340 3.3k
R2346 3.3k
C2344 16V 220
C2348 16V 1000
R2380
R2359 15k
33k
R2348 33k
C2342 50V 1.0
R2342 33k
R2345 4.7k
C2343 50V 1.0
R2349 4.7k
R2352 3.3k
C2340 16V 10
C2341 16V 10

X–Board TNPA0205
All Receivers


IC3001
IC2451
IC2402
IC2401
IC4402
TPX15
TPX16
TNPA0205

C–Board Schematic


R2360
R2359
15k
33k
C2342
50V
1.0
R2342
33k
R2346
3.3k
R2345
4.7k
C2340
16V
10
R2348
33k
R2349
4.7k
C2341
16V
10
C2343
50V
1.0
C2344
16V
220
C2346
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R2352
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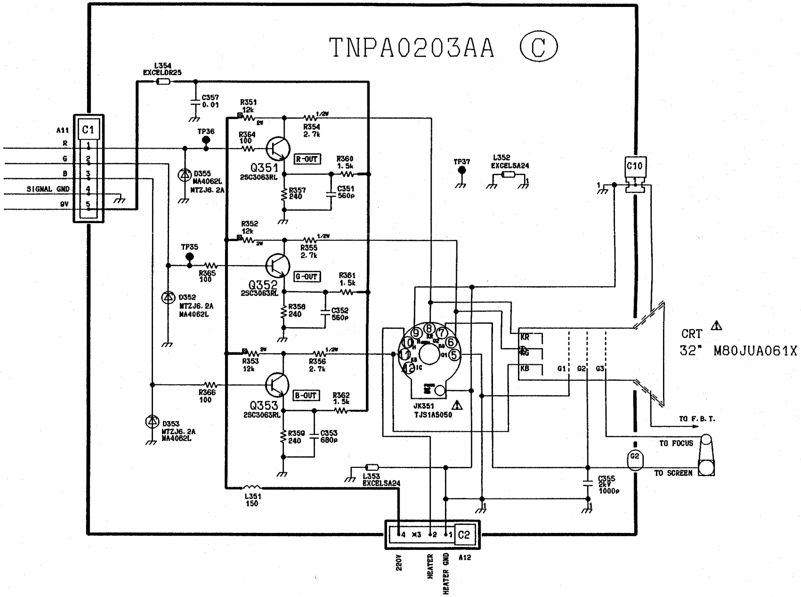
C2347
16V
220
R2350
3.3k

C–Board Schematic
32” Receivers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C357
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C1
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G
B
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2
3
4
5
TP36
D355
MA4062L
MTZJ6.2A
R351
12k
2W
R364
100
R354
2.7k
1/2W
Q351
2SC3063RL
R-OUT
R360
1.5k
R357
240
C351
560p
R352
12k
2W
R355
2.7k
1/2W
TP35
R365
100
D352
MTZJ6.2A
MA4062L
Q352
2SC3063RL
G-OUT
R361
1.5k
R358
240
C352
560p
R353
12k
2W
R356
2.7k
1/2W
R366
100
D353
MTZJ6.2A
MA4062L
Q353
2SC3063RL
B-OUT
R362
1.5k
R359
240
C353
680p
L351
150
L353
EXCELSA24
TP37
L352
EXCELSA24
C10
JK351
TJS1A5050
KR
KG
KB
G1
G2
G3
CRT
32" M80JUA061X
TO F.B.T.
TO FOCUS
TO SCREEN
G2
C355
2kV
1000p
C2
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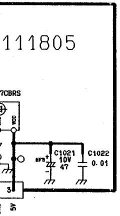
220V
HEATER
HEATER GND

Schematic
2S20U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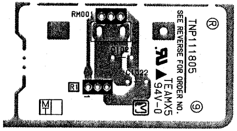
5V

R–Board TNP111805
32” Receivers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R
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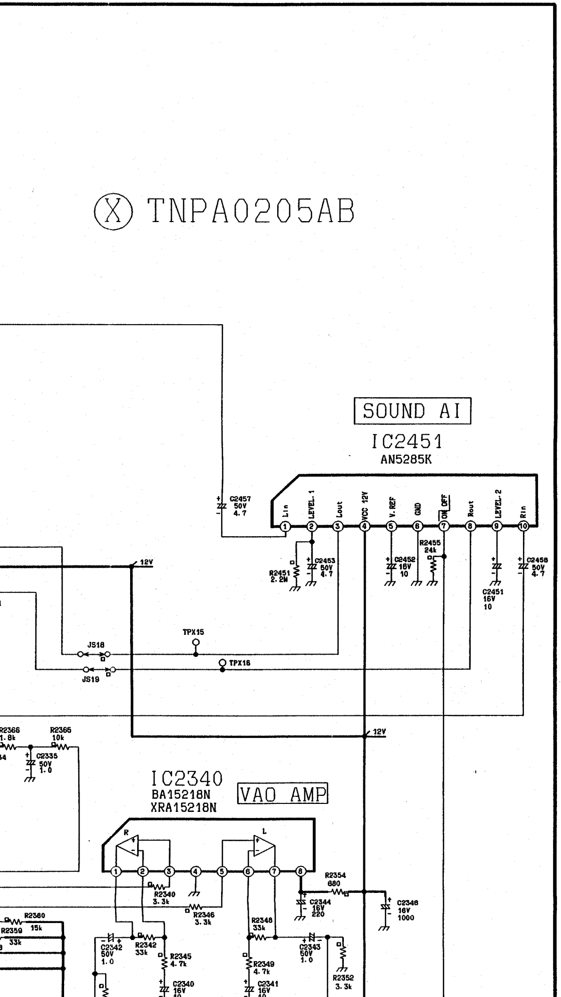
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IC2451
AN5285K
Lin
LEVEL 1
Lout
VCC 12V
V. REF
GND
ON OFF
Rout
LEVEL 2
Rin
C2457 50V 4.7
R2451 2.2M
C2453 50V 4.7
C2452 16V 10
R2455 24k
C2451 16V 10
C2458 50V 4.7
12V
TPX15
TPX16
JS18
JS19
R2366 1.8k
R2365 10k
C2335 50V 1.0
IC2340
BA15218N
XRA15218N
VAO AMP
R
L
R2354 680
C2344 16V 220
C2348 16V 1000
R2340 3.3k
R2346 3.3k
R2348 33k
R2360
R2359 15k
33k
C2342 50V 1.0
R2342 33k
R2345 4.7k
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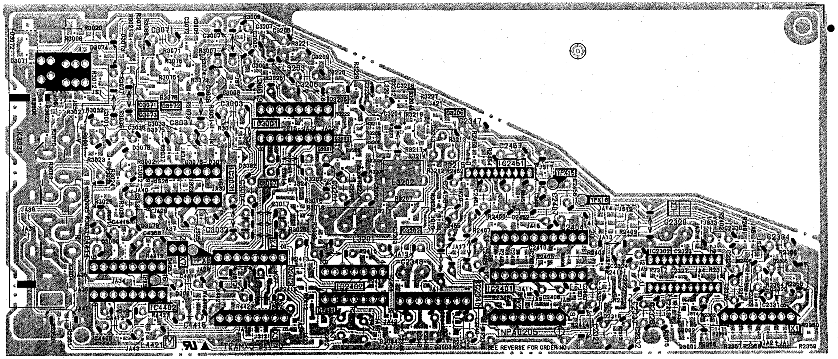
R2352 3.3k

X–Board TNPA0205
All Receivers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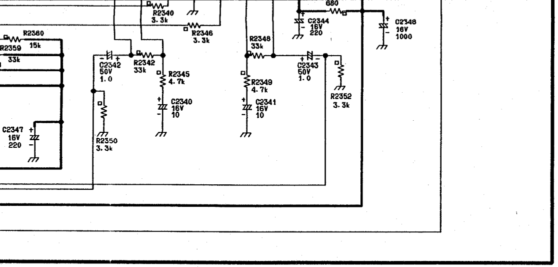
SEE REVERSE FOR ORDER NO.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R2346
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C2348
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33k
C2342
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1.0
R2342
33k
R2348
33k
C2343
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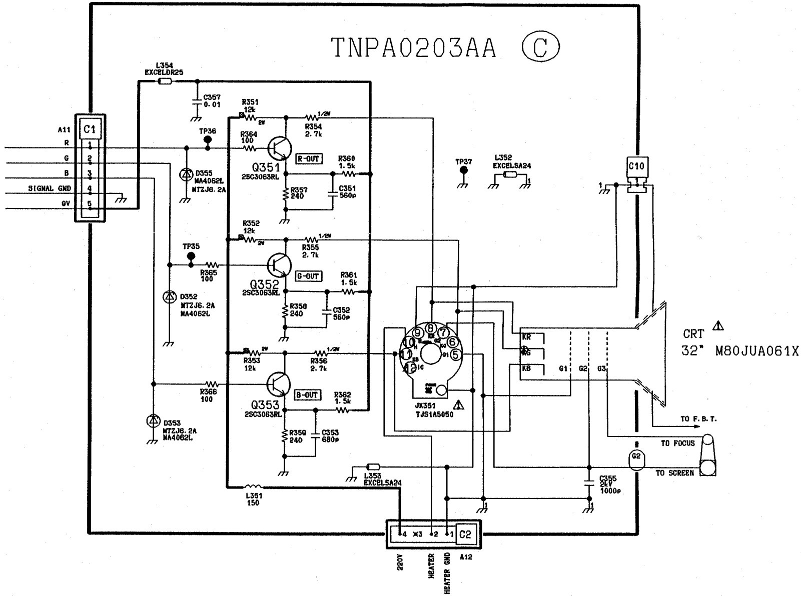
1.0
R2345
4.7k
R2349
4.7k
R2352
3.3k
C2340
16V
10
C2341
16V
10
C2347
16V
220
R2350
3.3k

C–Board Schematic
32" Receivers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C357
0.01
A11
C1
R
G
B
SIGNAL GND
9V
1
2
3
4
5
TP36
D355
MA4062L
MTZJ6.2A
R351
12k
2W
R354
2.7k
1/2W
R364
100
Q351
2SC3063RL
R-OUT
R360
1.5k
R357
240
C351
560p
R352
12k
2W
R355
2.7k
1/2W
TP35
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1.5k
D352
MTZJ6.2A
MA4062L
R358
240
C352
560p
R353
12k
2W
R356
2.7k
1/2W
R366
100
Q353
2SC3063RL
B-OUT
R362
1.5k
D353
MTZJ6.2A
MA4062L
R359
240
C353
680p
L351
150
L353
EXCELSA24
TP37
L352
EXCELSA24
C10
JK351
TJS1A5050
KR
KG
KB
G1
G2
G3
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TO F.B.T.
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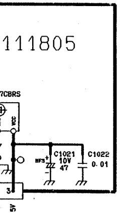
TO SCREEN
G2
C355
2kV
1000p
4
X3
2
1
C2
220V
HEATER
HEATER GND
A12

Schematic
2S20U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7CBRS
C1021
10V
47
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3
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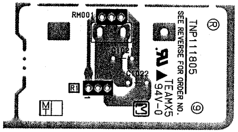
R–Board TNP111805
32" Receivers


R
TNP111805
SEE REVERSE FOR ORDER NO.
TEAMX5
94V-0
RM001
R1
9

ORDER NO. MTC9606645A1
B5

Service Manual

Supplement

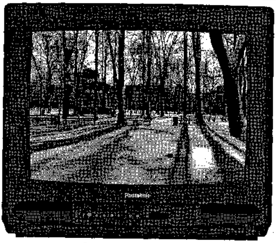
PANA-08236

Color Television
Panasonic

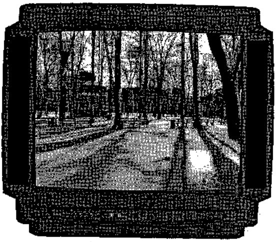
Models	Chassis
CT–32G21U	ALEDP276
CT–32G21UU	ALEDP276
CT–32G21CU	ANEDP276

(NA5D)

NOTE: Model CT–32G21UU is identical to CT–32G21U except for the magnetic field used in the factory to adjust purity and convergence for different markets.



CT–32G21U/UU



CT–32G21CU

For service information on Models **CT–32G21U, CT–32G21UU** and **CT–32G21CU** please file and use this Supplement Service Manual together with the Main Service Manual for Model **CT–32S20U** Order No. **MTC9606635A1.** Included in this Supplement Service Manual are Complete Parts List and A–Board schematic for Models **CT–32G21U and CT–32G21UU.** + 8234

NOTE: The Service Technician is required to read and follow the "Safety Precautions" and "Important Safety Notice" found in the Main Manual **MTC9606635A1.**

"WARNING! This Service Manual is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non–technical individuals of potential dangers in attempting to service a product. **Products powered by electricity should be serviced or repaired only by experienced professional technicians.** Any attempt to service or repair the product or products dealt with in this Service Manual by anyone else could result in serious injury or death."

Panasonic®

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Carolina, Puerto Rico 00985

Matsushita Electric of Canada Limited
5770 Ambler Drive Mississauga,
Ontario L4W 2T3
Canada

REPLACEMENT PARTS LIST

(Models: CT–32G21U/UU/CU)

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
		CAPRISTORS
CRA802	EXNG131P365	RES–CAP 130PF/3.6 MEG
CRA803	**EXNG131P365**	**RES–CAP 130PF/3.6 MEG**
		CAPACITORS
C002	TACCX103T50V	CAP,C .01UF/50V
C004	ECA1HM010	CAP,E 1.0UF/50V
C006	TACCW101T50V	CAP,C 100PF/50V
C007	TACCW101T50V	CAP,C 100PF/50V
C008	TACCX103T50V	CAP,C .01UF/50V
C009	ECA0JM101	CAP,E 100UF/6.3V
C010	TACCX103T50V	CAP,C .01UF/50V
C013	ECA0JM101	CAP,E 100UF/6.3V
C014	TACCW221T50V	CAP,C 220PF/50V
C017	TACCQ330T50V	CAP,C 33PF/50V
C018	TACCQ330T50V	CAP,C 33PF/50V
C019	ECA0JM101	CAP,E 100UF/6.3V
C020	ECA0JM471	CAP,E 470UF/6.3V
C021	TACCV561T50V	CAP,C 560PF/50V
C022	ECA1CM471	CAP,E 470UF/16V
C023	TACCX103T50V	CAP,C .01UF/50V
C024	ECA1HM4R7	CAP,E 4.7UF/50V
C026	ECA1CM102	CAP,E 1000UF/16V
C032	TACCX103T50V	CAP,C .01UF/50V
C036	TACCW222T50V	CAP,C 2200PF/50V
C040	ECA1CM470	CAP,E 47UF/16V
		CT–32G21U CT–32G21UU
C043	TACCW101T50V	CAP,C 100PF/50V
C044	TACCW101T50V	CAP,C 100PF/50V
C057	TACCW101T50V	CAP,C 100PF/50V
C058	TACCW101T50V	CAP,C 100PF/50V
C059	TACCW101T50V	CAP,C 100PF/50V
C102	ECA1CM100	CAP,E 10UF/16V
C104	ECA1HMR22	CAP,E .22UF/50V
C105	TACCQ270T50V	CAP,C 27PF/50V
C106	TACCW122T50V	CAP,C 1200PF/50V
C107	ECA1HMR47	CAP,E .47UF/50V
C109	ECA0JM471	CAP,E 470UF/6.3V
C110	TACCX103T50V	CAP,C .01UF/50V
C111	TACCR010T50V	CAP,C 10PF/50V
C115	TACCX103T50V	CAP,C .01UF/50V
C117	TACCV470T50V	CAP,C 47PF/50V
C126	ECA1CM331	CAP,E 330UF/16V
C151	ECA1HMR22	CAP,E .22UF/50V
C152	TACCQ680T50V	CAP,C 68PF/50V
C153	TACCQ150T50V	CAP,C 15PF/50V
C201	ECCF1H680JP	CAP,C 68PF–J–50V
C202	TACCX103T50V	CAP,C .01UF/50V
C203	TACCX103T50V	CAP,C .01UF/50V
C301	ECEA1CN100U	CAP,E 10UF–16V
C302	ECA1CM331	CAP,E 330UF/16V
C303	ECA1CM220	CAP,E 22UF/16V
C304	ECA1HM4R7	CAP,E 4.7UF/50V
C305	ECA1HMR33	CAP,E .33UF/50V
C306	ECA1HM4R7	CAP,E 4.7UF/50V
C308	ECQB1H223JF	CAP,P .022UF–J–50V
C309	ECEA1HN010U	CAP,E 1UF–50V
C310	ECA1CM100	CAP,E 10UF/16V
C311	ECQB1H473JF	CAP,P .047UF–J–50V
C312	ECA1CM220	CAP,E 22UF/16V
C313	TACCV390T50V	CAP,C 39PF/50V
C315	TACCW151T50V	CAP,C 150PF/50V
C316	TACCW181T50V	CAP,C 180PF/50V
C351	TACCW561T50V	CAP,C 560PF/50V
C352	TACCW561T50V	CAP,C 560PF/50V
C353	TACCW681T50V	CAP,C 680PF/50V
C355	ECKD3D102KB	CAP,C .001UF–K–2KV
C357	TACCX103T50V	CAP,C .01UF/50V
C401	ECA1HMR33	CAP,E .33UF/50V
C402	TACCW331T50V	CAP,C 330PF/50V
C403	ECEA1HNR47U	CAP,E .47UF–50V
C451	**ECEA1CGE221**	**CAP,E 220UF/16V**
C452	ECSF1EE105	CAP,T 1.0UF/25V
C453	ECEA1HFS2R2	CAP,E 2.2UF/50V
C454	ECEA1EGE102	CAP,E 1000UF/25V
C455	ECEA1VGE101	CAP,E 100UF/35V
C456	ECQV1H224JM	CAP,P .22UF–J–50V
C457	ECEA1HFS100	CAP,E 10UF–50V
C458	ECA1HM4R7	CAP,E 4.7UF/50V
C460	ECEA1HGE010	CAP,E 1UF/50V
C461	ECQM1104JZ	CAP,P .1UF–J–100V
C462	ECEA1VGE471	CAP,E 470UF/35V
C501	TACCW821T50V	CAP,C 820PF/50V
C502	ECA1HM2R2	CAP,E 2.2UF/50V
C503	ECQB1H153JF	CAP,P .015UF–J–50V
C504	ECQB1H103JF	CAP,P .01UF–J–50V
C505	ECQB1H223JF	CAP,P .022UF–J–50V
C506	ECA1CM221	CAP,E 220UF/16V
C507	TACCW221T50V	CAP,C 220PF/50V
C509	ECCF1H221JU	CAP,C 220PF–J–50V
C510	ECCD2H100D	CAP,C 10PF–D–500V
C511	ECKD3A821KB	CAP,C 820PF–K–1KVDC
C512	**ECEA160V33Z**	**CAP,E 33UF/160V**
C515	ECKD3A101KB	CAP,C 100PF–K–1KV
C517	TACCX103T50V	CAP,C .01UF/50V
C531	**ECA1EM330**	**CAP,E 33UF/25V**
C532	ECA1CM220	CAP,E 22UF/16V
C552	TACCX103T50V	CAP,C .01UF/50V
C555	ECEA2EU220	CAP,E 22UF/250V
C558	ECA1CM471	CAP,E 470UF/16V
C559	ECA2AM220	CAP,E 22UF/100V
C560	ECEA1HN2R2U	CAP,E 2.2UF/50V
C563	**TAC4R6B133JC**	**CAP,P .013UF/1200V**
C564	**TAC4S6B332JC**	**CAP,P 3300PF/1200V**
C566	**ECKD3D181JB**	**CAP,C 180PF–J–2KV**
C568	ECQM4473JZ	CAP,P .047UF–J–400V
C569	**ECQF2H434JS**	**CAP,P .43UF–J–200V**
C571	ECQM4562JZ	CAP,P 5600UF–J–400V
C572	ECEA1EGE100	CAP,E 10UF/25V
C573	ECA1EM100	CAP,E 10UF/25V
C574	ECKD2H561KB	CAP,C 560PF–K–500V
C575	ECA0JM222	CAP,E 2200UF/6.3V
C601	TACCV101T50V	CAP,C 100PF/50V

REPLACEMENT PARTS LIST

(Models: CT-32G21U/UU/CU)

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF. NO.	PART NO.	DESCRIPTION
C602	ECCF1H150JU	CAP,C 15PF–J–50V
C607	TACCV101T50V	CAP,C 100PF/50V
C754	ECQB1H104KF	CAP,P .1UF–K–50V
C755	ECQB1H104KF	CAP,P .1UF–K–50V
C756	ECA0JM221	CAP,E 220UF–6.3V
C757	ECA1VM102	CAP,E 1000UF/35V
C759	ECQE1395KN	CAP,P 3.9UF–K–100V
C801	ECKDAE472ZE	CAP,C 4700PF–Z–250V
C802	ECKDAE472ZE	CAP,C 4700PF–Z–250V
C803	ECKD2H472PU	CAP,C .0047UF–P–500V
C804	ECKDAE472ZE	CAP,C 4700PF–Z–250V
C805	**EC0S2DA471B4**	**CAP,E 470UF/160V**
C806	**ECQU2A153MN**	**CAP,P.015UF–M–250VAC**
C807	**ECQU2A153MN**	**CAP,P.015UF–M–250VAC**
C809	ECEA1JFS220	CAP,E 22UF/63V
C810	ECQM2473KZ	CAP,P .047UF–K–200V
C811	ECKD3A102KB	CAP,C .001UF–K–1KV
C812	ECKD3A102KB	CAP,C .001UF–K–1KV
C813	ECKD2H152KB	CAP,C .0015UF–K–500V
C814	**ECQU2A224MN**	**CAP,P.22UF–M–250VAC**
C815	ECQB1H273JF	CAP,P .027UF–J–50V
C816	ECKD3A152KB	CAP,C .0015UF–K–1KV
C817	ECKD3A102KB	CAP,C .001UF–K–1KV
C818	**EC0S2DA221B4**	**CAP,E 220UF/200V**
C819	ECKD2H391KB	CAP,C 390PF–K–500V
C821	ECKD3A102KB	CAP,C .001UF–K–1KV
C822	**ECEA1EGE102**	**CAP,E 1000UF/25V**
C823	ECKD3A561KB	CAP,C 560PF–K–1KV
C824	ECEA1EGE222	CAP,E 2200UF/25V
C828	ECQB1H473JF	CAP,P .047UF–J–50V
C829	ECKD2H331KB	CAP,C 330PF–K–500V
C831	ECA1VM102	CAP,E 1000UF/35V
C1021	ECEA1AFS470	CAP,E 47UF/10V
		CT–32G21CU
C1022	ECKF1H103ZF	CAP,C .01UF–Z–50V
		CT–32G21CU
C1051	TACCW101T50V	CAP,C 100PF/50V
C1801	ECEA1HKA010	CAP,E 1.0UF/50V
C1802	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C1803	ECEA1HKA010	CAP,E 1.0UF/50V
C1805	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C1806	ECEA1CKA100	CAP,E 10UF/16V
C1807	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C1808	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C1809	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C1810	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C1811	ECEA1EKA4R7	CAP,E 4.7UF/25V
C1812	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C1813	ECEA0JKA331Q	CAP,E 330UF/6.3V
C1814	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C1820	ECUX1H390JCX	CAP,C 39PF–J–50V
C1837	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C1838	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C2201	AP335K016CAE	CAP,T 3.3UF/16V
C2202	ECEA1HGE4R7	CAP,E 4.7UF–50V
C2203	ECA1HM010	CAP,E 1.0UF/50V
C2204	ECA1HM4R7	CAP,E 4.7UF/50V
C2205	ECEA1HGE4R7	CAP,E 4.7UF–50V
C2206	ECEA1HGE4R7	CAP,E 4.7UF–50V
C2207	ECA1HM4R7	CAP,E 4.7UF/50V
C2208	ECA1HM4R7	CAP,E 4.7UF/50V
C2209	ECA1CM101	CAP,E 100UF/16V
C2210	ECA1HMR33	CAP,E .33UF/50V
C2211	ECQB1H104JF	CAP,P .1UF–J–50V
C2212	ECQB1H104JF	CAP,P .1UF–J–50V
C2213	ECQB1H104JF	CAP,P .1UF–J–50V
C2214	ECQB1H104JF	CAP,P .1UF–J–50V
C2215	ECQB1H223JF	CAP,P .022UF–J–50V
C2216	TACCW332T50V	CAP,C .0033UF/50V
C2219	AP106K016CAE	CAP,T 10UF/16V
C2301	ECA1EM102	CAP,E 1000UF/25V
C2302	ECA1HM010	CAP,E 1.0UF/50V
C2303	TACCW392T50V	CAP,C 3900PF/50V
C2304	TACCW392T50V	CAP,C 3900PF/50V
C2305	ECA1HM010	CAP,E 1.0UF/50V
C2306	ECA1CM102	CAP,E 1000UF/16V
C2307	ECA1CM102	CAP,E 1000UF/16V
C2308	ECEA1EN470U	CAP,E 47UF/25V
C2309	ECQB1H104JF	CAP,P .1UF–J–50V
C2310	ECEA1CN100U	CAP,E 10UF–16V
C2311	ECEA1EN470U	CAP,E 47UF/25V
C2312	ECA1EM101	CAP,E 100UF/25V
C2313	ECA1EM101	CAP,E 100UF/25V
C2314	ECQB1H104JF	CAP,P .1UF–J–50V
C2315	ECA1EM100	CAP,E 10UF/25V
C2316	ECA1CM101	CAP,E 100UF/16V
C2318	TACCW332T50V	CAP,C .0033UF/50V
C2319	TACCW332T50V	CAP,C .0033UF/50V
C2320	ECA1CM222	CAP,E 2200UF–16V
C2321	ECA1HM010	CAP,E 1.0UF/50V
C2322	ECA1CM100	CAP,E 10UF/16V
C2323	ECUX1H103KBX	CAP,C .01UF–K–50V
C2324	ECQB1H683JF	CAP,P .068UF–J–50V
C2325	ECEA1HN3R3U	CAP,E 3.3UF–50V
C2326	ECEA1HN3R3U	CAP,E 3.3UF–50V
C2327	ECUX1H103KBX	CAP,C .01UF–K–50V
C2328	ECQB1H683JF	CAP,P .068UF–J–50V
C2331	ECA1CM100	CAP,E 10UF/16V
C2332	ECA1CM100	CAP,E 10UF/16V
C2333	ECA1CM100	CAP,E 10UF/16V
C2334	ECA1HM010	CAP,E 1.0UF/50V
C2335	ECA1HM010	CAP,E 1.0UF/50V
C2340	ECA1CM100	CAP,E 10UF/16V
C2341	ECA1CM100	CAP,E 10UF/16V
C2342	ECA1HM010	CAP,E 1.0UF/50V
C2343	ECA1HM010	CAP,E 1.0UF/50V
C2344	ECA1CM221	CAP,E 220UF/16V
C2347	ECA1CM221	CAP,E 220UF/16V
C2348	ECA1CM102	CAP,E 1000UF/16V
C2451	ECA1CM100	CAP,E 10UF/16V
C2452	ECA1CM100	CAP,E 10UF/16V
C2453	ECA1HM4R7	CAP,E 4.7UF/50V

REPLACEMENT PARTS LIST

(Models: CT–32G21U/UU/CU)

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REF. NO.	PART NO.	DESCRIPTION
C2457	ECA1HM4R7	CAP,E 4.7UF/50V
C2458	ECA1HM4R7	CAP,E 4.7UF/50V
C3001	ECA1HM010	CAP,E 1.0UF/50V
C3002	ECA1HM010	CAP,E 1.0UF/50V
C3003	ECA1CM100	CAP,E 10UF/16V
C3004	ECA1CM220	CAP,E 22UF/16V
C3005	ECA1CM220	CAP,E 22UF/16V
C3006	ECA1CM470	CAP,E 47UF/16V
C3007	ECUX1H103KBX	CAP,C .01UF–K–50V
C3008	ECUX1H151JCX	CAP,C 150PF–J–50V
C3031	ECA1CM100	CAP,E 10UF/16V
C3032	ECA1CM100	CAP,E 10UF/16V
C3033	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C3034	ECA1HM010	CAP,E 1.0UF/50V
C3035	ECA1HM010	CAP,E 1.0UF/50V
C3036	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C3037	ECA1CM470	CAP,E 47UF/16V
C3071	ECA1CM220	CAP,E 22UF/16V
C3072	ECUX1H103KBX	CAP,C .01UF–K–50V
C3201	ECA1CM470	CAP,E 47UF/16V
C3202	ECQB1H473JF	CAP,P .047UF–J–50V
C3203	ECUX1H103KBX	CAP,C .01UF–K–50V
C3204	ECUX1H103KBX	CAP,C .01UF–K–50V
C3206	ECEA1AN220U	CAP,E 22UF–10V
C3207	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C3208	ECUX1H101JCX	CAP,C 100PF–J–50V
C3209	ECUX1H121JCX	CAP,C 120PF–J–50V
C3212	ECUX1H390JCX	CAP,C 39PF–J–50V
C4353	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C4354	ECEA1CKA220	CAP,E 22UF/16V
C4355	ECEA1CKA100	CAP,E 10UF/16V
C4356	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C4357	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C4358	ECA1CM470	CAP,E 47UF/16V
C4359	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C4360	ECEA1CKA220	CAP,E 22UF/16V
C4361	ECEA1HKA2R2	CAP,E 2.2UF/50V
C4362	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C4363	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C4364	ECEA1HKA3R3	CAP,E 3.3UF/50V
C4365	ECEA1HKAR47	CAP,E .47UF/50V
C4367	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C4368	ECUX1H681KBX	CAP,C 680PF–K–50V
C4369	ECEA1HKAR47	CAP,E .47UF/50V
C4370	ECUX1H391KBX	CAP,C 390PF–K–50V
C4371	ECEA1HN010U	CAP,E 1UF–50V
C4374	ECUX1H122JCX	CAP,C .0012UF–J–50V
C4375	ECEA1HKA010	CAP,E 1.0UF/50V
C4380	ECRHA030E81	TRIMMER:30PF
C4390	ECA0JM331	CAP,E 330UF/6.3V
C4407	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C4408	ECUX1H101JCX	CAP,C 100PF–J–50V
C4411	ECA1CM100	CAP,E 10UF/16V
C4412	ECEA1CN100U	CAP,E 10UF–16V
C4414	ECEA1CN100U	CAP,E 10UF–16V
C4415	ECA1CM100	CAP,E 10UF/16V
C4416	ECA1CM100	CAP,E 10UF/16V
C4420	ECUX1H820JCX	CAP,C 82PF–J–50V
		DIODES
D001	ERA15–01	DIODE
D002	MA167	DIODE
D003	MTZJT–774.7B	DIODE, ZENER
D004	MTZJT–776.2C	DIODE, ZENER
D005	MA165	DIODE
D006	MA165	DIODE
D007	MA165	DIODE
D024	MTZJT–7736B	DIODE, ZENER
D026	MTZJT–776.2A	DIODE, ZENER
D352	MTZJT–776.2A	DIODE, ZENER
D353	MTZJT–776.2A	DIODE, ZENER
D355	MTZJT–776.2A	DIODE, ZENER
D451	ERA15–01	DIODE
D452	MA165	DIODE
D453	MA165	DIODE
D454	MA4120M	DIODE
D455	MTZJT–7712A	DIODE, ZENER
D456	MA165	DIODE
D501	MTZJT–778.2B	DIODE, ZENER
D531	**AS01**	**DIODE**
D532	MTZMT–776.2A	DIODE, ZENER
D554	**AS01**	**DIODE**
D555	MA165	DIODE
D556	MTZJT–7739D	DIODE, ZENER
D558	**RS3FS**	**DIODE**
D559	**TVSRU3MV1**	**DIODE, RECTIFIER**
D560	MA165	DIODE
D563	MA165	DIODE
D801	**TVSRM11B**	**DIODE**
D802	**TVSRM11B**	**DIODE**
D803	**TVSRM11B**	**DIODE**
D804	**TVSRM11B**	**DIODE**
D805	**TRPW5B0M030D**	**THERMISTOR**
D806	TVSRU1CV	DIODE, RECTIFIER
D807	MTZJT–777.5B	DIODE, ZENER
D808	AU01	DIODE
D809	**RU30ALFS1**	**DIODE, RECTIFIER**
D810	**RU3YX–MLF–C2**	**DIODE**
D811	**RU3YX–MLF–C2**	**DIODE**
D812	**AU02**	**DIODE**
D1801	MA151K	DIODE
D3001	MA151K	DIODE
D3002	MA151K	DIODE
D3071	MA3110M	DIODE
D3072	MA3110M	DIODE
D3073	MA3110M	DIODE
D3074	MA3110M	DIODE
D3075	MA3110M	DIODE
D3076	MA3110M	DIODE
D3077	MA3110M	DIODE
D3078	MA3110M	DIODE
D3079	MA3110M	DIODE
D3080	MA3110M	DIODE

REPLACEMENT PARTS LIST

(Models: CT-32G21U/UU/CU)

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REF. NO.	PART NO.	DESCRIPTION
D3081	MA3110M	DIODE
D3082	MA3110M	DIODE
		FUSES
F801	**0BA1C40NU100**	**FUSE 4.0A/125V**
		INTEGRATED CIRCUITS
IC001	MN1873265T6F	INT CKT
IC002	24LC02BIP	INT CKT
IC101	**AN5163K**	**INT CKT**
IC451	**LA7836-TV**	**INT CKT**
IC551	**AN78M09**	**PLUS 9V AVR**
IC552	AN78L12	INT CKT
IC553	AN78M05	PLUS 5V AVR
IC801	**STK730-020**	**INT CKT**
IC1051	RPM-637CBRS	IR RECEIVER, REMOTE CONTROL
		CT-32G21U CT-32G21UU
IC1801	M65607SP	INT CKT
IC1802	M4C264AL-12	INT CKT
IC1803	M52694P	INT CKT
IC1804	MN1280R	INT CKT
IC2201	AN5818NK	INT CKT
IC2301	AN7147N	INT CKT
IC2302	CXA1279AS	INT CKT
IC2340	BA15218N	INT CKT
IC2402	MC14066BCP	INT CKT
IC2451	AN5265K	INT CKT
IC3001	M52055P	INT CKT
IC3031	M52055P	INT CKT
IC4402	M52055P	INT CKT
		COILS
DEG	0LK19050	COIL, DEGAUSSING
DY	**TLYA007**	**YOKE, DEFLECTION**
L001	EXCELSA24	FERRITE BEAD
L003	TLUABTA4R7K	COIL, PEAKING 4.7UH
L004	TLUABTA4R7K	COIL, PEAKING 4.7UH
L005	TLUABTA100K	COIL, PEAKING 10UH
L008	TLUABTA120K	COIL, PEAKING 12UH
L009	EXCELSA35	FERRITE BEAD
L012	TLUABTA1R0K	COIL, PEAKING 1.0UH
L021	TLUABTA390K	COIL, PEAKING 39UH
L101	TLTACT150K	COIL, PEAKING 15UH
L102	TLQ015J205C	COIL, PEAKING
L103	TLQ015J205C	COIL, PEAKING
L105	EIV7EN053B	VCO
L108	TLUABTA1R0K	COIL, PEAKING 1.0UH
L109	TLUABTA1R0K	COIL, PEAKING 1.0UH
L151	EIV7EN041B	COIL, AFT
L201	EQS7EN053B	COIL, QUADRATURE
L351	TLUABTA151K	COIL, PEAKING 150UH
L352	EXCELSA35	FERRITE BEAD
L353	EXCELSA35	FERRITE BEAD
L354	EXCELDR25C	FERRITE BEAD
L551	**TLH6663P**	**COIL, LINEARITY**
L553	EXCELSA24	FERRITE BEAD
L557	0SC9002	FERRITE BEAD
L558	EXCELSA24	FERRITE BEAD
L559	EXCELSA35	FERRITE BEAD
L563	ELEIE330KA	COIL, 33UH
L571	ELEIE680KA	COIL, PEAKING 68UH
L601	TLTACT100K	COIL, PEAKING 10UH
L751	**TLH15727**	**REACTOR, PINCUSHION**
L801	**TLPD008**	**LINE FILTER**
L802	ELEIE330KA	COIL, 33UH
L803	EXCELSA39	FERRITE BEAD
L804	EXCELSA39	FERRITE BEAD
L806	EXCELSA35	FERRITE BEAD
L808	0SC9002	FERRITE BEAD
L810	EXCELSA24	FERRITE BEAD
L811	EXCELSA35	FERRITE BEAD
L814	0SC9002	FERRITE BEAD
L815	0SC9002	FERRITE BEAD
L816	0SC9002	FERRITE BEAD
L818	EXCELSA35	FERRITE BEAD
L819	EXCELSA35	FERRITE BEAD
L1051	TLUABTA151K	COIL, PEAKING 150UH
L1802	TLTACT100K	COIL, PEAKING 10UH
L3001	TLTACT100K	COIL, PEAKING 10UH
L3201	EFDEN645B35B	DELAY LINE
L3202	EIK1EG024B	CHROMA TRAP
L3203	TLTACT180K	COIL, PEAKING 18UH
L3204	TLTACT100K	COIL, PEAKING 10UH
L4351	TLTACT2R2K	COIL, PEAKING 2.2UH
L4352	TLTACT100K	COIL, PEAKING 10UH
L4353	EXCELDR25C	FERRITE BEAD
L4402	TLTACT100K	COIL, PEAKING 10UH
		TRANSISTORS
Q001	2SA564AQRS	TRANSISTOR
Q002	2SC1685QRS	TRANSISTOR
Q003	2SC1685QRS	TRANSISTOR
Q004	2SA564AQRS	TRANSISTOR
Q005	2SC1685QRS	TRANSISTOR
Q101	2SC1685QRS	TRANSISTOR
Q103	2SC1685QRS	TRANSISTOR
Q305	2SA564AQRS	TRANSISTOR
Q306	2SC1685QRS	TRANSISTOR
Q307	2SC1685QRS	TRANSISTOR
Q351	2SC3063	TRANSISTOR
Q352	2SC3063	TRANSISTOR
Q353	2SC3063	TRANSISTOR
Q451	2SC1685QRS	TRANSISTOR
Q452	2SC1685QRS	TRANSISTOR
Q501	2SC4212H	TRANSISTOR
Q551	**BU2508DF**	**TRANSISTOR**
Q751	2SC1685QRS	TRANSISTOR
Q752	2SA564AQRS	TRANSISTOR
Q753	**2SD1266**	**TRANSISTOR**
Q2301	2SC1685QRS	TRANSISTOR
Q2302	2SA564AQRS	TRANSISTOR
Q2401	MSD601R	TRANSISTOR
Q2402	MSD601R	TRANSISTOR
Q3007	MSB709R	TRANSISTOR
Q3071	MSD601R	TRANSISTOR
Q3072	MSD601R	TRANSISTOR

REPLACEMENT PARTS LIST

(Models: CT–32G21U/UU/CU)

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REF. NO.	PART NO.	DESCRIPTION
Q3073	MSD601R	TRANSISTOR
Q3201	MSD601R	TRANSISTOR
Q3202	MSD601R	TRANSISTOR
Q3203	MSD601R	TRANSISTOR
Q3204	MSD601R	TRANSISTOR
Q3205	MSD601R	TRANSISTOR
Q3206	MSD601R	TRANSISTOR
Q4351	MSB709R	TRANSISTOR
Q4354	MSB709R	TRANSISTOR
Q4355	MSB709R	TRANSISTOR
Q4356	MSB709R	TRANSISTOR
Q4357	MSD601R	TRANSISTOR
Q4358	MSB709R	TRANSISTOR
Q4360	MSD601R	TRANSISTOR
Q4361	MSD601R	TRANSISTOR
Q4362	MSD601R	TRANSISTOR
Q4363	MSD601R	TRANSISTOR
Q4369	MSB709R	TRANSISTOR
Q4370	MSB709R	TRANSISTOR
Q4371	MSD601R	TRANSISTOR
Q4401	MSB709R	TRANSISTOR
		RELAYS
RL801	**TSEH8007**	**RELAY**
		RESISTORS
RM001	RPM–637CBRS	IR RECEIVER, REMOTE CONTROL CT–32G21CU
R001	ERDS2TJ101	RES,C 100–J–1/4
R002	ERDS2TJ182	RES,C 1.8K–J–1/4
R003	ERDS2TJ472	RES,C 4.7K–J–1/4
R004	ERDS2TJ331	RES,C 330–J–1/4
R005	ERDS2TJ101	RES,C 100–J–1/4
R006	ERDS2TJ473	RES,C 47K–J–1/4
R007	ERDS2TJ222	RES,C 2.2K–J–1/4
R008	ERDS2TJ222	RES,C 2.2K–J–1/4
R009	ERDS2TJ222	RES,C 2.2K–J–1/4
R010	ERDS2TJ182	RES,C 1.8K–J–1/4
R011	ERDS2TJ681	RES,C 680–J–1/4
R012	ERDS2TJ681	RES,C 680–J–1/4
R013	ERDS2TJ681	RES,C 680–J–1/4
R015	ERDS2TJ392	RES,C 3.9K–J–1/4
R016	ERDS2TJ472	RES,C 4.7K–J–1/4
R017	ERDS2TJ472	RES,C 4.7K–J–1/4
R018	ERDS2TJ683	RES,C 68K–J–1/4
R019	ERDS2TJ823	RES,C 82K–J–1/4
R020	ERDS2TJ474	RES,C 470K–J–1/4
R021	ERDS2TJ101	RES,C 100–J–1/4
R022	ERDS2TJ101	RES,C 100–J–1/4
R023	ERDS2TJ102	RES,C 1K–J–1/4
R025	ERDS2TJ272	RES,C 2.7K–J–1/4
R026	ERDS2TJ472	RES,C 4.7K–J–1/4
R027	ERDS2TJ181	RES,C 180–J–1/4
R029	ERDS2TJ102	RES,C 1K–J–1/4
R030	ER0S2CKF1002	RES,M 10K–F–1/4
R031	ERDS2TJ121	RES,C 120–J–1/4
R032	ERDS1FJ330	RES,C 33–J–1/2
R033	ERDS2TJ222	RES,C 2.2K–J–1/4
R034	ERDS2TJ222	RES,C 2.2K–J–1/4
R035	ERDS2TJ332	RES,C 3.3K–J–1/4
R036	ERDS2TJ562	RES,C 5.6K–J–1/4
R037	ERDS2TJ103	RES,C 10K–J–1/4
R038	ERDS2TJ223	RES,C 22K–J–1/4
R039	ERDS2TJ101	RES,C 100–J–1/4
R041	ERDS2TJ122	RES,C 1.2K–J–1/4
R042	ERDS2TJ391	RES,C 390–J–1/4
R043	ERDS2TJ103	RES,C 10K–J–1/4
R044	ERDS2TJ334	RES,C 330K–J–1/4
R045	ERDS2TJ684	RES,C 680K–J–1/4
R047	ERDS2TJ223	RES,C 22K–J–1/4
R048	ERDS2TJ302	RES,C 3K–J–1/4
R050	ERDS2TJ153	RES,C 15K–J–1/4
R051	ERDS2TJ273	RES,C 27K–J–1/4
R053	ERDS2TJ102	RES,C 1K–J–1/4
R054	ERDS2TJ102	RES,C 1K–J–1/4
R055	ERDS2TJ101	RES,C 100–J–1/4
R056	ERDS2TJ101	RES,C 100–J–1/4
R057	ERDS2TJ221	RES,C 220–J–1/4
R058	ERDS2TJ221	RES,C 220–J–1/4
R059	ERDS2TJ221	RES,C 220–J–1/4
R060	ERDS2TJ102	RES,C 1K–J–1/4
R071	ERDS2TJ101	RES,C 100–J–1/4
R073	ERDS2TJ103	RES,C 10K–J–1/4
R074	ERG1SJ473P	RES,M 47K–J–1W
R082	ERDS2TJ103	RES,C 10K–J–1/4
R093	ERDS2TJ102	RES,C 1K–J–1/4
R101	ERDS2TJ683	RES,C 68K–J–1/4
R103	ERDS2TJ183	RES,C 18K–J–1/4
R104	ERDS2TJ121	RES,C 120–J–1/4
R105	ERDS2TJ102	RES,C 1K–J–1/4
R106	EVND2AA03B14	CONTROL 10K
R107	ERDS2TJ222	RES,C 2.2K–J–1/4
R111	ERDS2TJ361	RES,C 360–J–1/4
R112	ERDS2TJ561	RES,C 560–J–1/4
R113	ERDS2TJ473	RES,C 47K–J–1/4
R114	ERDS2TJ104	RES,C 100K–J–1/4
R115	ERDS2TJ221	RES,C 220–J–1/4
R152	ERDS2TJ154	RES,C 150K–J–1/4
R201	ERDS2TJ221	RES,C 220–J–1/4
R203	ERDS2TJ392	RES,C 3.9K–J–1/4
R304	ERDS2TJ274	RES,C 270K–J–1/4
R305	ERDS2TJ102	RES,C 1K–J–1/4
R306	ERDS2TJ102	RES,C 1K–J–1/4
R313	ERDS2TJ471	RES,C 470–J–1/4
R316	ERDS2TJ682	RES,C 6.8K–J–1/4
R317	ERDS2TJ221	RES,C 220–J–1/4
R319	ERDS2TJ514	RES,C 510K–J–1/4
R321	ERDS2TJ471	RES,C 470–J–1/4
R323	ERDS2TJ101	RES,C 100–J–1/4
R324	ERDS2TJ331	RES,C 330–J–1/4
R325	ERDS2TJ222	RES,C 2.2K–J–1/4
R326	ERDS2TJ471	RES,C 470–J–1/4
R328	ERDS2TJ332	RES,C 3.3K–J–1/4
R351	ERG2ANJP123H	RES,M 12K–J–2W

REPLACEMENT PARTS LIST

(Models: CT–32G21U/UU/CU)

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REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION
R352	ERG2ANJP123H	RES,M 12K–J–2W	R551	ERX1ANJ1R0	RES,M 1.0–J–1W
R353	ERG2ANJP123H	RES,M 12K–J–2W	R552	ERG3SJS181H	RES,M 180–J–3W
R354	ERDS1TJ272	RES,C 2.7K–J–1/2	R554	ERG2ANJ390	RES,M 39–J–2W
R355	ERDS1TJ272	RES,C 2.7K–J–1/2	R556	ERDS2TJ202	RES,C 2K–J–1/4
R356	ERDS1TJ272	RES,C 2.7K–J–1/2	R557	ERDS2TJ103	RES,C 10K–J–1/4
R357	ERDS2TJ241	RES,C 240–J–1/4	**R558**	**ERQ2CJP2R4**	**RES,F 2.4–J–2W**
R358	ERDS2TJ241	RES,C 240–J–1/4	R560	ERG2ANJP561H	RES,M 560–J–2W
R359	ERDS2TJ241	RES,C 240–J–1/4	R561	ERG2ANJP102H	RES,M 1K–J–2W
R360	ERDS2TJ152	RES,C 1.5K–J–1/4	R563	ERDS2TJ223	RES,C 22K–J–1/4
R361	ERDS2TJ152	RES,C 1.5K–J–1/4	R564	ERDS2TJ563	RES,C 56K–J–1/4
R362	ERDS2TJ152	RES,C 1.5K–J–1/4	R565	ERDS2TJ472	RES,C 4.7K–J–1/4
R364	ERDS2TJ101	RES,C 100–J–1/4	R571	ERX1SJ1R0	RES,M 1.0–J–1W
R365	ERDS2TJ101	RES,C 100–J–1/4	R601	ERDS2TJ152	RES,C 1.5K–J–1/4
R366	ERDS2TJ101	RES,C 100–J–1/4	R602	ERDS2TJ392	RES,C 3.9K–J–1/4
R401	ERDS2TJ224	RES,C 220K–J–1/4	R604	ERDS2TJ331	RES,C 330–J–1/4
R402	ERDS2TJ561	RES,C 560–J–1/4	R605	ERDS2TJ331	RES,C 330–J–1/4
R404	ERDS2TJ221	RES,C 220–J–1/4	R606	ERDS2TJ331	RES,C 330–J–1/4
R451	ERDS2TJ471	RES,C 470–J–1/4	R614	ERDS2TJ222	RES,C 2.2K–J–1/4
R452	ERDS2TJ473	RES,C 47K–J–1/4	R615	ERDS2TJ222	RES,C 2.2K–J–1/4
R453	EVND2AA03B34	CONTROL 30K	R616	ERDS2TJ222	RES,C 2.2K–J–1/4
R454	ERX1ANJ1R2	RES,M 1.2–J–1W	R617	ERDS2TJ222	RES,C 2.2K–J–1/4
R455	ERDS2TJ333	RES,C 33K–J–1/4	R619	ERDS2TJ331	RES,C 330–J–1/4
R456	ERDS2TJ273	RES,C 27K–J–1/4	R752	ERDS2TJ333	RES,C 33K–J–1/4
R457	ERDS2TJ102	RES,C 1K–J–1/4	R753	ERDS2TJ103	RES,C 10K–J–1/4
R458	ERDS2TJ223	RES,C 22K–J–1/4	R754	ERQ14AJ221	RES,F 220–J–1/4
R459	ERDS2TJ102	RES,C 1K–J–1/4	R755	ERDS2TJ563	RES,C 56K–J–1/4
R460	ERDS2TJ103	RES,C 10K–J–1/4	R756	ERDS2TJ103	RES,C 10K–J–1/4
R461	ERDS2TJ102	RES,C 1K–J–1/4	R757	ERDS2TJ224	RES,C 220K–J–1/4
R462	ERDS2TJ473	RES,C 47K–J–1/4	R758	ERDS2TJ273	RES,C 27K–J–1/4
R463	ERDS2TJ224	RES,C 220K–J–1/4	R759	ERDS2TJ222	RES,C 2.2K–J–1/4
R464	ERDS2TJ124	RES,C 120K–J–1/4	R760	EVND8AA03B53	CONTROL 5K
R465	ERDS1FJ1R5	RES,C 1.5–J–1/2	R761	EVND8AA03B14	CONTROL 10K
R466	ERDS2TJ101	RES,C 100–J–1/4	R762	ERDS2TJ182	RES,C 1.8K–J–1/4
R467	ERDS2TJ102	RES,C 1K–J–1/4	R763	ERDS2TJ183	RES,C 18K–J–1/4
R470	ERDS2TJ153	RES,C 15K–J–1/4	R764	ERDS2TJ124	RES,C 120K–J–1/4
R471	ERDS2TJ271	RES,C 270–J–1/4	R765	ERDS2TJ272	RES,C 2.7K–J–1/4
R501	ERDS2TJ102	RES,C 1K–J–1/4	R766	ERDS2TJ362	RES,C 3.6K–J–1/4
R502	ERDS2TJ272	RES,C 2.7K–J–1/4	R767	ERDS2TJ222	RES,C 2.2K–J–1/4
R503	ERDS2TJ182	RES,C 1.8K–J–1/4	R768	ERQ2CJP100	RES,F 10–J–2W
R504	ERDS2TJ561	RES,C 560–J–1/4	**R801**	**ERF7ZKR82**	**RES,W .82–K–7W**
R505	ERDS2TJ561	RES,C 560–J–1/4	R804	ERG2ANJ333	RES,M 33K–J–2W
R506	ERDS2TJ100	RES,C 10–J–1/4	R805	ERF2AKR22	RES,W .22–K–2W
R507	ERDS2TJ562	RES,C 5.6K–J–1/4	R806	ERDS2TJ273	RES,C 27K–J–1/4
R508	ERDS2TJ562	RES,C 5.6K–J–1/4	R807	ERDS1FJ132	RES,C 1.3K–J–1/2
R509	ERG2ANJP562H	RES,M 5.6K–J–2W	R811	ERQ1CKPR33	RES,F .33–K–1W
R510	**ERG3ANJ242**	**RES,M 2.4K–J–3W**	R812	ERQ1CKR33	RES,F .33–K–1W
R511	**ERG3ANJ242**	**RES,M 2.4K–J–3W**	R814	ERDS2TJ185	RES,C 1.8MEG–J–1/4
R514	ERDS2TJ561	RES,C 560–J–1/4	**R815**	**ERC12ZGM825**	**RES,S 8.2MEG–M–1/2**
R515	ERDS2TJ224	RES,C 220K–J–1/4	R816	ERDS2TJ105	RES,C 1MEG–J–1/4
R531	**ERD25FJ470**	**RES,C 47–J–1/4**	R817	ERDS2TJ185	RES,C 1.8MEG–J–1/4
R532	**ER0S2CKF5362**	**RES,M 53.6K–F–1/4**	R818	ERDS2TJ101	RES,C 100–J–1/4
R533	**ER0S2CKF6491**	**RES,M 6.49K–F–1/4**	**R819**	**ERDS1FJ1R0**	**RES,C 1.0–J–1/2**
R534	ERDS2TJ684	RES,C 680K–J–1/4	R1023	ERDS2TJ102	RES,C 1K–J–1/4
R538	ERDS2TJ821	RES,C 820–J–1/4	R1024	ERDS2TJ103	RES,C 10K–J–1/4
R539	**ERDS2TJ681**	**RES,C 680–J–1/4**	R1025	ERDS2TJ103	RES,C 10K–J–1/4
R540	ERDS2TJ101	RES,C 100–J–1/4	R1029	ERDS2TJ102	RES,C 1K–J–1/4

REPLACEMENT PARTS LIST

(Models: CT-32G21U/UU/CU)

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REF. NO.	PART NO.	DESCRIPTION
R1030	ERDS2TJ473	RES,C 47K–J–1/4
R1051	ERDS2TJ102	RES,C 1K–J–1/4
R1801	ERJ6GEYJ101	RES,M 100–J–1/10
R1802	ERJ6GEYJ101	RES,M 100–J–1/10
R1803	ERJ6GEYJ103	RES,M 10K–J–1/10
R1804	ERJ6GEYJ562	RES,M5.6K–J–1/10
R1805	ERJ6GEYJ562	RES,M5.6K–J–1/10
R1806	ERJ6GEYJ750	RES,M75–J–1/10
R1807	ERJ6GEYJ750	RES,M75–J–1/10
R1811	ERJ6GEYJ103	RES,M 10K–J–1/10
R1812	ERJ6GEYJ103	RES,M 10K–J–1/10
R1813	ERJ6GEYJ103	RES,M 10K–J–1/10
R1814	EVND8AA03B23	CONTROL 2K
R1815	ERJ6GEYJ473	RES,M47K–J–1/10
R1816	ERJ6GEYJ473	RES,M47K–J–1/10
R1817	ERJ6GEYJ683	RES,M68K–J–1/10
R1818	ERJ6GEYJ562	RES,M5.6K–J–1/10
R1819	ERJ6GEYJ153	RES,M 15K–J–1/10
R1821	ERJ6GEYJ221	RES,M220–J–1/10
R1822	ERJ6GEYJ221	RES,M220–J–1/10
R1823	ERJ6GEYJ221	RES,M220–J–1/10
R1824	ERJ6GEYJ221	RES,M220–J–1/10
R1825	ERJ6GEYJ221	RES,M220–J–1/10
R1826	ERJ6GEYJ221	RES,M220–J–1/10
R1827	ERJ6GEYJ221	RES,M220–J–1/10
R1828	ERJ6GEYJ221	RES,M220–J–1/10
R1830	ERJ6GEYJ221	RES,M220–J–1/10
R1831	ERJ6GEYJ221	RES,M220–J–1/10
R1832	ERJ6GEYJ221	RES,M220–J–1/10
R1833	ERJ6GEYJ221	RES,M220–J–1/10
R2201	ERDS2TJ472	RES,C 4.7K–J–1/4
R2202	ERDS2TJ153	RES,C 15K–J–1/4
R2203	ERDS2TJ104	RES,C 100K–J–1/4
R2204	ERDS2TJ473	RES,C 47K–J–1/4
R2205	ERDS2TJ154	RES,C 150K–J–1/4
R2206	ERDS2TJ471	RES,C 470–J–1/4
R2207	ERDS2TJ471	RES,C 470–J–1/4
R2208	ER0S2CKF9102	RES,M 91K–F–1/4
R2212	ERDS2TJ682	RES,C 6.8K–J–1/4
R2220	ERDS2TJ682	RES,C 6.8K–J–1/4
R2221	ERDS2TJ472	RES,C 4.7K–J–1/4
R2301	ERDS2TJ102	RES,C 1K–J–1/4
R2302	ERDS2TJ102	RES,C 1K–J–1/4
R2303	ERDS2TJ912	RES,C 9.1K–J–1/4
R2304	ERDS2TJ912	RES,C 9.1K–J–1/4
R2305	ERD25FJ2R2	RES,C 2.2–J–1/4
R2306	ERD25FJ2R2	RES,C 2.2–J–1/4
R2307	ERDS2TJ392	RES,C 3.9K–J–1/4
R2308	ERDS2TJ392	RES,C 3.9K–J–1/4
R2310	ERDS2TJ103	RES,C 10K–J–1/4
R2311	ERDS2TJ103	RES,C 10K–J–1/4
R2312	ERJ6GEYJ184	RES,M 180K–J–1/10
R2313	ERJ6GEYJ104	RES,M 100K–J–1/10
R2315	ERDS2TJ682	RES,C 6.8K–J–1/4
R2316	ERDS2TJ331	RES,C 330–J–1/4
R2340	ERJ6GEYJ332	RES,M3.3K–J–1/10
R2342	ERJ6GEYJ333	RES,M33K–J–1/10
R2345	ERJ6GEYJ472	RES,M4.7K–J–1/10
R2346	ERJ6GEYJ332	RES,M3.3K–J–1/10
R2348	ERJ6GEYJ333	RES,M33K–J–1/10
R2349	ERJ6GEYJ472	RES,M4.7K–J–1/10
R2350	ERJ6GEYJ332	RES,M3.3K–J–1/10
R2351	ERJ6GEYJ222	RES,M2.2K–J–1/10
R2352	ERJ6GEYJ332	RES,M3.3K–J–1/10
R2353	ERJ6GEYJ222	RES,M2.2K–J–1/10
R2354	ERJ6GEYJ681	RES,M680–J–1/10
R2355	ERJ6GEYJ223	RES,M22K–J–1/10
R2356	ERJ6GEYJ223	RES,M22K–J–1/10
R2357	ERJ6GEYJ752	RES,M7.5K–J–1/10
R2358	ERJ6GEYJ273	RES,M27K–J–1/10
R2359	ERJ6GEYJ333	RES,M33K–J–1/10
R2360	ERJ6GEYJ153	RES,M 15K–J–1/10
R2362	ERJ6GEYJ473	RES,M47K–J–1/10
R2363	ERJ6GEYJ473	RES,M47K–J–1/10
R2364	ERJ6GEYJ223	RES,M22K–J–1/10
R2365	ERJ6GEYJ103	RES,M 10K–J–1/10
R2366	ERJ6GEYJ182	RES,M 1.8K–J–1/10
R2401	ERJ6GEYJ392	RES,M3.9K–J–1/10
R2402	ERJ6GEYJ392	RES,M3.9K–J–1/10
R2411	ERJ6GEYJ103	RES,M 10K–J–1/10
R2412	ERJ6GEYJ104	RES,M 100K–J–1/10
R2415	ERJ6GEYJ473	RES,M47K–J–1/10
R2416	ERJ6GEYJ104	RES,M 100K–J–1/10
R2451	ERJ6GEYJ225	RES,M2.2MEG–J–1/10
R2455	ERJ6GEYJ243	RES,M24K–J–1/10
R2456	ERDS2TJ103	RES,C 10K–J–1/4
R3001	ERJ6GEYJ102	RES,M 1K–J–1/10
R3003	ERJ6GEYJ184	RES,M 180K–J–1/10
R3004	ERJ6GEYJ184	RES,M 180K–J–1/10
R3005	ERJ6GEYJ101	RES,M 100–J–1/10
R3006	ERJ6GEYJ750	RES,M75–J–1/10
R3008	ERJ6GEYJ680	RES,M68–J–1/10
R3009	ERJ6GEYJ101	RES,M 100–J–1/10
R3010	ERJ6GEYJ750	RES,M75–J–1/10
R3011	ERJ6GEYJ101	RES,M 100–J–1/10
R3012	ERJ6GEYJ683	RES,M68K–J–1/10
R3014	ERJ6GEYJ103	RES,M 10K–J–1/10
R3015	ERJ6GEYJ104	RES,M 100K–J–1/10
R3016	ERJ6GEYJ221	RES,M220–J–1/10
R3017	ERJ6GEYJ102	RES,M 1K–J–1/10
R3024	ERJ6GEYJ102	RES,M 1K–J–1/10
R3025	ERJ6GEYJ470	RES,M47–J–1/10
R3031	ERJ6GEYJ101	RES,M 100–J–1/10
R3032	ERJ6GEYJ750	RES,M75–J–1/10
R3033	ERJ6GEYJ184	RES,M 180K–J–1/10
R3034	ERJ6GEYJ102	RES,M 1K–J–1/10
R3035	ERJ6GEYJ184	RES,M 180K–J–1/10
R3036	ERJ6GEYJ102	RES,M 1K–J–1/10
R3037	ERJ6GEYJ683	RES,M68K–J–1/10
R3038	ERJ6GEYJ683	RES,M68K–J–1/10
R3071	ERJ6GEYJ223	RES,M22K–J–1/10
R3072	ERJ6GEYJ683	RES,M68K–J–1/10

REPLACEMENT PARTS LIST

(Models: CT–32G21U/UU/CU)

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REF. NO.	PART NO.	DESCRIPTION
R3073	ERJ6GEYJ683	RES,M68K–J–1/10
R3074	ERJ6GEYJ223	RES,M22K–J–1/10
R3075	ERJ6GEYJ102	RES,M1K–J–1/10
R3076	ERJ6GEYJ102	RES,M1K–J–1/10
R3077	ERJ6GEYJ152	RES,M1.5K–J–1/10
R3078	ERJ6GEYJ471	RES,M470–J–1/10
R3079	ERJ6GEYJ101	RES,M100–J–1/10
R3080	ERJ6GEYJ471	RES,M470–J–1/10
R3201	ERJ6GEYJ103	RES,M10K–J–1/10
R3202	ERJ6GEYJ223	RES,M22K–J–1/10
R3203	ERJ6GEYJ101	RES,M100–J–1/10
R3204	ERJ6GEYJ102	RES,M1K–J–1/10
R3205	ERJ6GEYJ272	RES,M2.7K–J–1/10
R3206	ERJ6GEYJ682	RES,M6.8K–J–1/10
R3207	ERJ6GEYJ103	RES,M10K–J–1/10
R3208	ERJ6GEYJ102	RES,M1K–J–1/10
R3209	ERJ6GEYJ102	RES,M1K–J–1/10
R3210	ERJ6GEYJ103	RES,M10K–J–1/10
R3211	ERJ6GEYJ181	RES,M180–J–1/10
R3212	ERJ6GEYJ331	RES,M330–J–1/10
R3213	ERJ6GEYJ102	RES,M1K–J–1/10
R3214	ERJ6GEYJ331	RES,M330–J–1/10
R3215	EVND8AA03B22	CONTROL 200 OHM
R3217	ERJ6GEYJ271	RES,M270–J–1/10
R3218	ERJ6GEYJ122	RES,M1.2K–J–1/10
R3220	ERJ6GEYJ331	RES,M330–J–1/10
R3221	ERJ6GEYJ122	RES,M1.2K–J–1/10
R3222	ERJ6GEYJ471	RES,M470–J–1/10
R3223	ERJ6GEYJ471	RES,M470–J–1/10
R3224	ERJ6GEYJ471	RES,M470–J–1/10
R3227	ERJ6GEYJ332	RES,M3.3K–J–1/10
R3228	ERJ6GEYJ104	RES,M100K–J–1/10
R3229	ERJ6GEYJ152	RES,M1.5K–J–1/10
R4356	ERJ6GEYJ681	RES,M680–J–1/10
R4358	ERJ6GEYJ102	RES,M1K–J–1/10
R4359	ERJ6GEYJ471	RES,M470–J–1/10
R4360	ERJ6GEYJ102	RES,M1K–J–1/10
R4361	ERJ6GEYJ560	RES,M56–J–1/10
R4362	ERJ6GEYJ561	RES,M560–J–1/10
R4363	ERJ6GEYJ471	RES,M470–J–1/10
R4364	ERJ6GEYJ102	RES,M1K–J–1/10
R4365	ERJ6GEYJ683	RES,M68K–J–1/10
R4367	ERJ6GEYJ331	RES,M330–J–1/10
R4368	ERJ6GEYJ510	RES,M51–J–1/10
R4369	ERJ6GEYJ105	RES,M1.0MEG–J–1/10
R4370	ERJ6GEYJ222	RES,M2.2K–J–1/10
R4371	ERJ6GEYJ102	RES,M1K–J–1/10
R4372	ERJ6GEYJ471	RES,M470–J–1/10
R4373	ERJ6GEYJ822	RES,M8.2K–J–1/10
R4374	ERJ6GEYJ273	RES,M27K–J–1/10
R4375	ERJ6GEYJ221	RES,M220–J–1/10
R4376	ERJ6GEYJ471	RES,M470–J–1/10
R4377	ERJ6GEYJ223	RES,M22K–J–1/10
R4378	ERJ6GEYJ562	RES,M5.6K–J–1/10
R4379	ERJ6GEYJ103	RES,M10K–J–1/10
R4380	ERJ6GEYJ683	RES,M68K–J–1/10

REF. NO.	PART NO.	DESCRIPTION
R4381	ERJ6GEYJ331	RES,M330–J–1/10
R4382	ERJ6GEYJ101	RES,M100–J–1/10
R4383	ERJ6GEYJ471	RES,M470–J–1/10
R4384	ERJ6GEYJ331	RES,M330–J–1/10
R4395	ERJ6GEYJ102	RES,M1K–J–1/10
R4396	ERJ6GEYJ471	RES,M470–J–1/10
R4397	ERJ6GEYJ393	RES,M39K–J–1/10
R4398	ERJ6GEYJ334	RES,M330K–J–1/10
R4399	ERJ6GEYJ272	RES,M2.7K–J–1/10
R4414	ERJ6GEYJ101	RES,M100–J–1/10
R4415	ERJ6GEYJ101	RES,M100–J–1/10
R4417	ERJ6GEYJ101	RES,M100–J–1/10
R4418	ERJ6GEYJ101	RES,M100–J–1/10
R4420	ERJ6GEYJ103	RES,M10K–J–1/10
R4421	ERJ6GEYJ103	RES,M10K–J–1/10
R4423	ERJ6GEYJ473	RES,M47K–J–1/10
R4424	ERJ6GEYJ473	RES,M47K–J–1/10
R4426	ERJ6GEYJ561	RES,M560–J–1/10
R4427	ERJ6GEYJ223	RES,M22K–J–1/10
R4428	ERJ6GEYJ222	RES,M2.2K–J–1/10
R4441	ERJ6GEYJ101	RES,M100–J–1/10
R4442	ERJ6GEYJ102	RES,M1K–J–1/10
		SWITCHES
S001	EVQQKH06K	POWER
S002	EVQQKH06K	VOL DOWN
S003	EVQQKH06K	VOL UP
S004	EVQQKH06K	CH DOWN
S005	EVQQKH06K	CH UP
S006	EVQQKH06K	ACTION
S007	EVQQKH06K	TV/VIDEO
		TRANSFORMERS
TNR001	**ENV568Q9G3**	**TUNER**
T001	**TLP16297**	**TRANSFORMER, POWER SUPPLY**
T501	**TLH15452**	**TRANSFORMER, HORIZONTAL DRIVER**
T551	**0LF04508F**	**TRANSFORMER, FLYBACK**
T801	**ETS39AG115AC**	**TRANSFORMER, POWER**
		CRYSTALS/FILTERS
X001	TSS2080MX	CRYSTAL, 12 MHZ CLOCK
X101	EFCKM1963M	CERAMIC FILTER
X102	EFCWS4504AB	FILTER 4.5MHZ
X201	EFCS4R5MS4W	FILTER 4.5MHZ BANDPASS
X501	EF0A503KS41	CRYSTAL, 503KHZ OSCILLATOR
X601	TS816M32	CRYSTAL 3.58MHZ OSCILLATOR
X4351	TSS2163–M	CRYSTAL, 14.3MHZ OSCILLATOR
		OTHERS
M001	**M80JUA061X**	**CRT 32"**
M002	TAS2A9D07	SPEAKER 5" X 2.2"
M003	TBM2A10141	BADGE, PANASONIC
M004	TBX2A50251G	KEY BUTTON CT–32G21CU
M005	TBX2A50261AG	BUTTON, 7 KEY CT–32G21U CT–32G21UU
JK351	**TJS1A5050**	**CRT SOCKET**
M006	TKP2AA00501	BATTERY COVER, REMOTE

REPLACEMENT PARTS LIST

(Models: CT–32G21U/UU/CU)

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REF. NO.	PART NO.	DESCRIPTION
M007	TLC2047–2	MAGNET,RINGS:PURITY & STATIC CONV.
M008	TMM2A30701	WEDGE, YOKE
M009	TMW2A9151	SP BRACKET CT–32G21CU
M010	TMW2A97121	STRAIN RELIEF: AC LINE CORD
M011	TNQ2AE007	REMOTE CONTROL
M012	TQB2AA0057	MANUAL, OWNER'S CT–32G21U CT–32G21UU
M013	TQB2AA0058	MANUAL, OWNER'S CT–32G21CU
M014	**TSX2AA0011**	**LINE CORD 2CON–18AWG**
M015	TXFKU4196SER	ASSY., CABINET BACK CT–32G21U CT–32G21UU
M016	TXFKU4396SER	ASSY., CABINET BACK CT–32G21CU
M017	TXFKY5396SER	ASSY., CABINET FRONT CT–32G21U CT–32G21UU
M018	TXFKY5596SER	ASSY., CABINET FRONT CT–32G21CU
M019	TXF3A01AFR	ASSY., DAG GND
M020	0FMK014ZZ	CONVERGENCE CORRECTOR STRIP
JK3031	TJB18619	AV TERMINAL (2AV VAO)

DESCRIPTION OF ABBREVIATIONS GUIDE

RESISTOR			
TYPE		TOLERANCE	
C	Carbon	F	+/– 1%
F	Fuse	J	+/– 5%
M	Metal Oxide	K	+/– 10%
S	Solid	M	+/– 20%
W	Wire Wound	G	+/– 2%

RES, C 270–J–1/4

CAPACITOR			
TYPE		TOLERANCE	
C	Ceramic	C	+/– 0.25pF
E	Electrolytic	D	+/– 0.5pF
P	Polyester	F	+/– 1pF
S	Styrol	J	+/– 5%
T	Tantalum	K	+/– 10%
		L	+/– 15%
		M	+/– 20%
		P	+100%–0%
		Z	+80%–20%

CAP, P .068UF–K–50V

SERVICEMAN MODE (ELECTRONIC CONTROL)
SERVICE ADJUSTMENT VALUES

Model ____________________ Ser # ____________ Date ____________

Note: Record the original settings PRIOR to modifying the registers.

Mode	Service Adjustment	Adjustment Range	Def. Val.	Original Value	New Value
DAC Adjustments					
BO	Sub Bright	0 ~ 255	128		
B1	Sub Color	0 ~ 63	33		
B2	Sub Tint	0 ~ 63	33		
B3	Sub Contrast	0 ~ 63	34		
B4	Video Adjust.	0 ~ 15	8		
B5	Audio Adjust.	0 ~ 15	8		
CRT Adjustments					
C0	Horiz. Centering	0 ~ 15	8		
C1	RED Cutoff	0 ~ 255 *	128		
C2	GRN Cutoff	0 ~ 255 *	128		
C3	BLU Cutoff	0 ~ 255 *	128		
C4	RED Drive	0 ~ 255	128		
C5	BLU Drive	0 ~ 255	128		

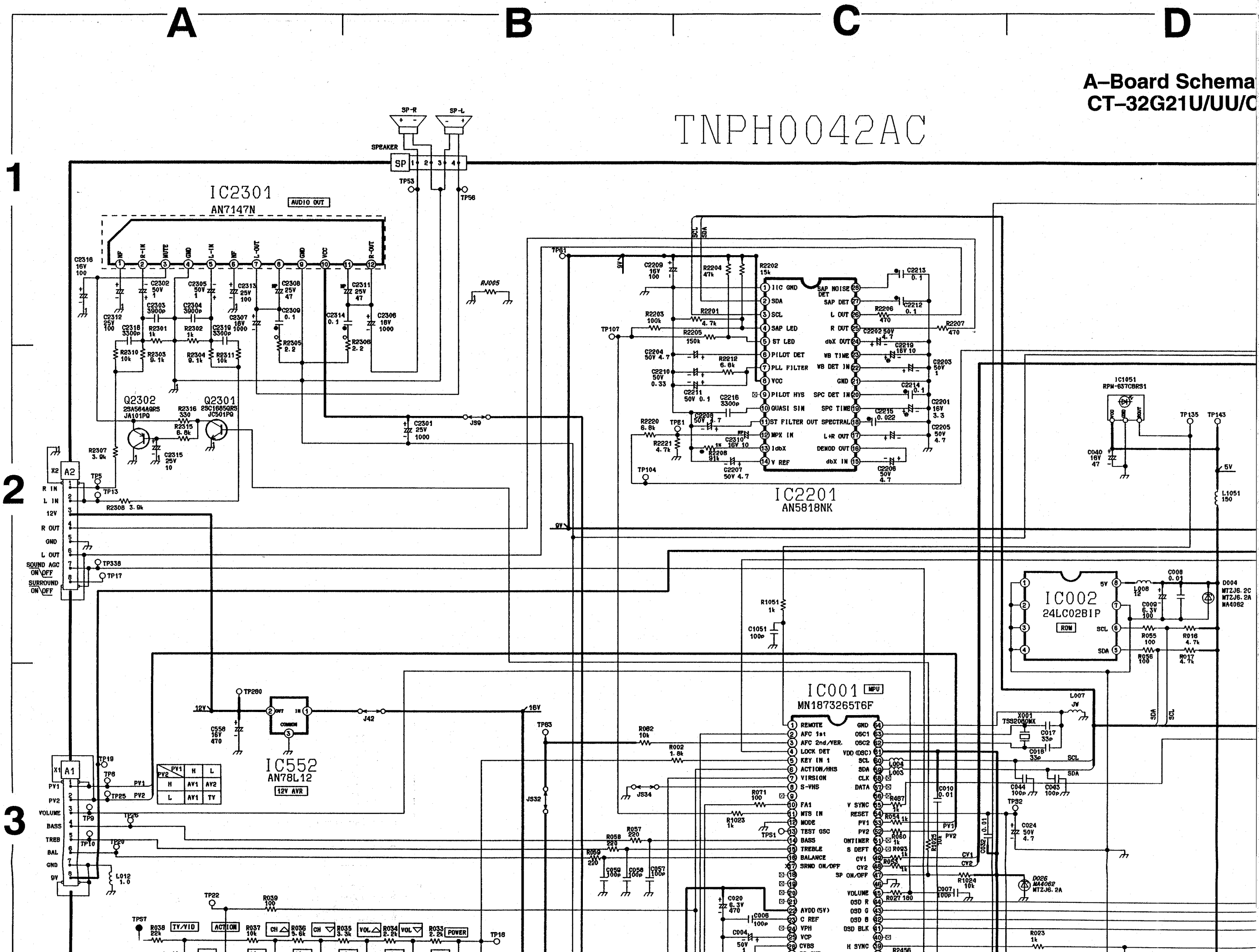
* Adjustment indicated in 2 steps:
0 ~ 255 then 1 ~ 255

Mode	Service Adjustment	Adjustment Range	Def. Val.	Original Value	New Value
Options Adjustments					
S0	PIP Color	0 ~ 127	25		
S1	PIP Tint	0 ~ 127	55		
S2	PIP Sync.	0 ~ 7	4		
S3	Upper 1/9	0 ~ 255	229		
S4	Lower 1/9	0 ~ 255	111		
S5	Left 1/9	0 ~ 255	27		
S6	Right 1/9	0 ~ 255	123		
S7	Upper 1/16	0 ~ 255	229		
S8	Lower 1/16	0 ~ 255	93		
S9	Left 1/16	0 ~ 255	27		
Sa	Right 1/16	0 ~ 255	137		
Sb	Clock Adjust.	0 ~ 255	128		
MTS Adjustments					
M0	Input Level	0 ~ 63	31		
M1	Stereo PLL VCO	0 ~ 63	31		
M2	Filter	0 ~ 63	31		
M3	Low Level Separ.	0 ~ 63	31		
M4	High Level Separ.	0 ~ 63	31		

Printed in USA
96064100A0625

Panasonic 8236

A–Board Schema
CT–32G21U/UU/C


A
B
C
D
1
2
3
TNPH0042AC
SP-R
SP-L
SPEAKER
SP
TP53
TP56
IC2301
AN7147N
AUDIO OUT
Q2302
2SA564AQRS
JA101PQ
Q2301
2SC1685QRS
JC501PQ
J39
RJ005
X2
A2
R IN
L IN
12V
R OUT
GND
L OUT
SOUND AGC ON/OFF
SURROUND ON/OFF
TP5
TP13
TP338
TP17
R2308 3.9k
IC2201
AN5818NK
TP81
TP107
TP104
TPE1
IIC GND
SDA
SCL
SAP LED
ST LED
PILOT DET
PLL FILTER
VCC
PILOT HYS
QUASI SIN
ST FILTER OUT
MPX IN
1dbX
V REF
SAP NOISE DET
SAP DET
L OUT
R OUT
dbX OUT
WB TIME
WB DET IN
GND
SPC DET IN
SPC TIME
SPECTRAL
L+R OUT
DEMOD OUT
dbX IN
IC1051
RPM-637CBRS1
TP135
TP143
5V
L1051 150
IC002
24LC02BIP
ROM
D004
MTZJ6.2C
MTZJ6.2A
MA4062
IC552
AN78L12
12V AVR
TP280
12V
16V
J42
X1
A1
PV1
PV2
VOLUME
BASS
TREB
BAL
GND
9V
TP19
TP8
TP25
TP26
TP9
TP10
TP20
L012 1.0
TP63
J532
J534
IC001
MPU
MN1873265T6F
REMOTE
AFC 1st
AFC 2nd/VER.
LOCK DET
KEY IN 1
ACTION/HRS
VIRSION
S-VHS
FA1
MTS IN
MODE
TEST OSC
BASS
TREBLE
BALANCE
SRND ON/OFF
AVDD (5V)
C REF
VPH
VCP
CVBS
GND
OSC1
OSC2
VDD (OSC)
SCL
SDA
CLK
DATA
V SYNC
RESET
PV1
PV2
ONTIMER
S DEFT
CV1
CV2
SP ON/OFF
VOLUME
OSD R
OSD G
OSD B
OSD BLK
H SYNC
X001
TSS2060NX
L007 JW
D026
MA4062
MTZJ6.2A
TP52
TPS1
TP22
TPS7
TP16
TV/VID
ACTION
CH △
CH ▽
VOL △
VOL ▽
POWER

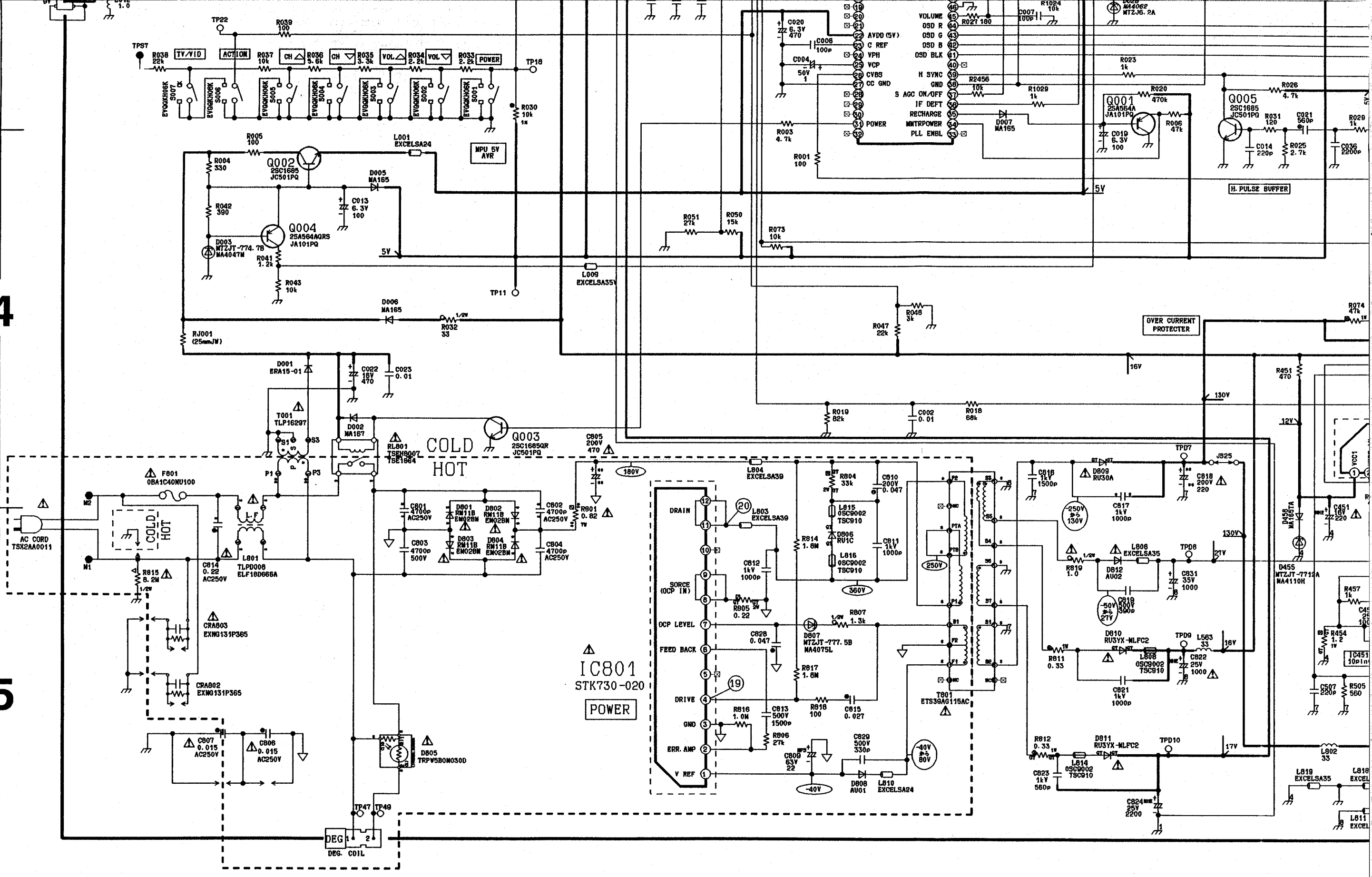
A-Board Schematic
CT-32G21U/UU/CU

Sheet 1 of 1
Side A

MTC9606645A1
B5

4

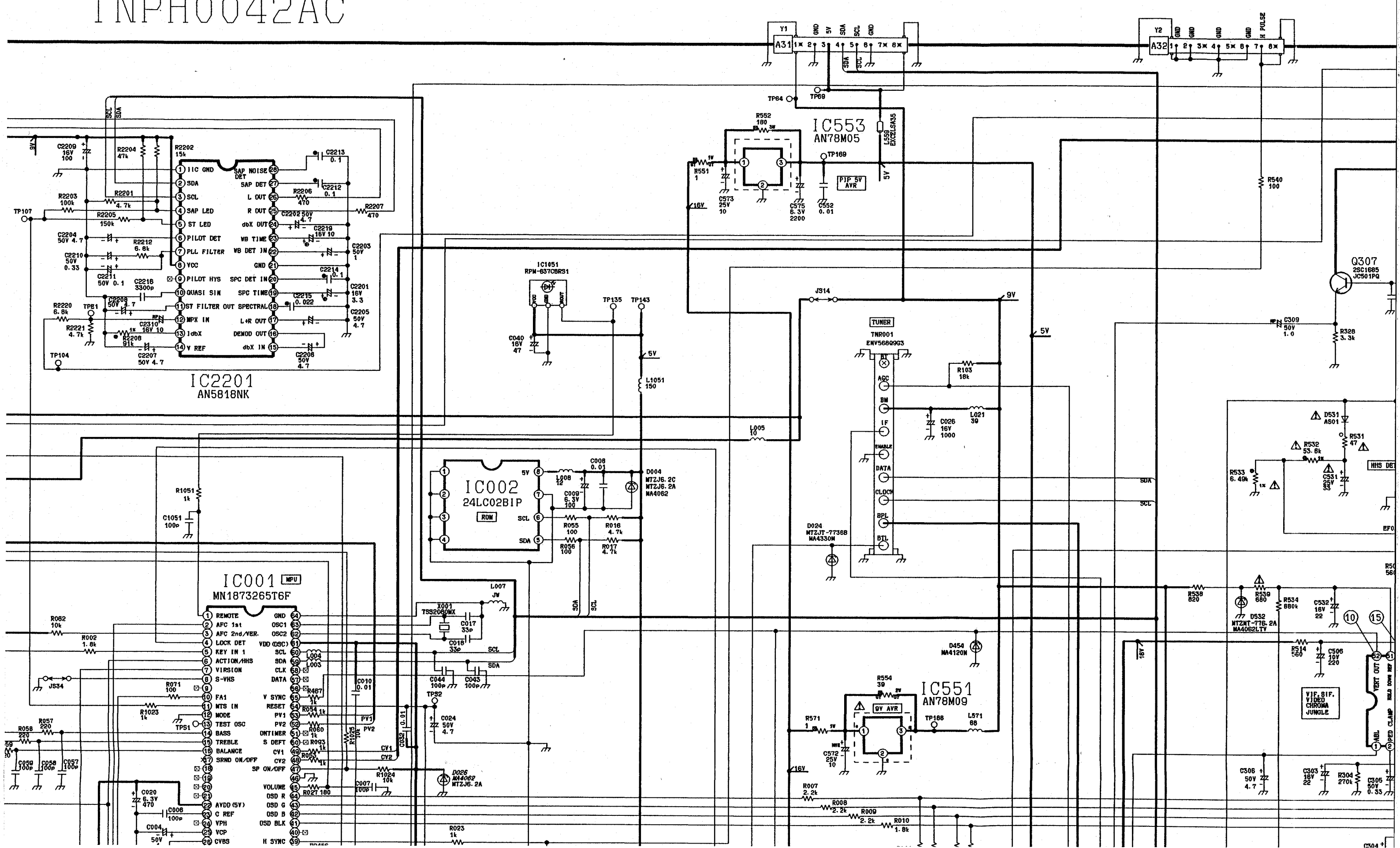
5

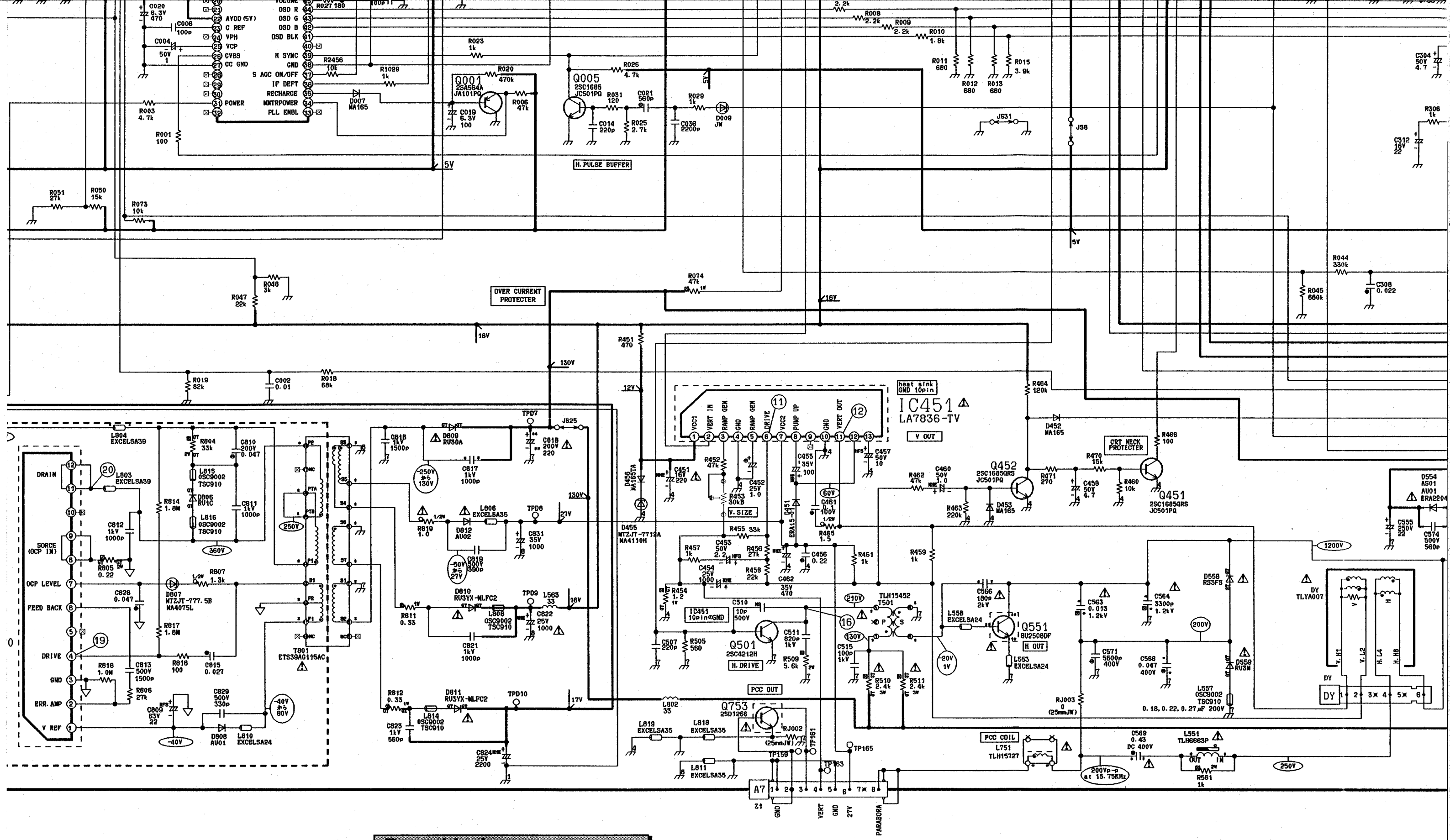

TV/VID
ACTION
CH △
CH ▽
VOL △
VOL ▽
POWER
S007
S006
S005
S004
S003
S002
S001
TP22
TP57
TP16
TP11
MPU 5V AVR
Q002 2SC1685 JC501PQ
Q004 2SA564AQRS JA101PQ
Q003 2SC1685QR JC501PQ
Q001 2SA564A JA101PQ
Q005 2SC1685 JC501PQ
H. PULSE BUFFER
OVER CURRENT PROTECTER
AVDD (5V)
C REF
VPH
VCP
CVBS
CC GND
POWER
VOLUME
OSD R
OSD G
OSD B
OSD BLK
H SYNC
GND
S AGC ON/OFF
IF DEFT
RECHARGE
MNTRPOWER
PLL ENBL
5V
16V
130V
12V
17V
27V
COLD
HOT
F801 0BA1C40NU100
AC CORD TSX2AA0011
T001 TLP16297
RL801 TSEN8007 TSE1664
D001 ERA15-01
D002 MA167
L801 TLPD008 ELF18D666A
CRA803 EXNG131P365
CRA802 EXNG131P365
D805 TRPV5B0N030D
DEG DEG. COIL
TP47
TP49
IC801
STK730-020
POWER
DRAIN
SORCE (OCP IN)
OCP LEVEL
FEED BACK
DRIVE
GND
ERR. AMP
V REF
180V
360V
250V
-40V
T801 ETS39AG115AC
D809 RU30A
D810 RU3YX-MLFC2
D811 RU3YX-MLFC2
D812 AU02
D807 MTZJT-777.5B MA4075L
D806 RU1C
D808 AU01
TPD7
TPD8
TPD9
TPD10
JS25
D455 MTZJT-7712A MA4110H
Board Index
"A"-Board – Main Chassis

Board Index
"A"–Board – Main Chassis

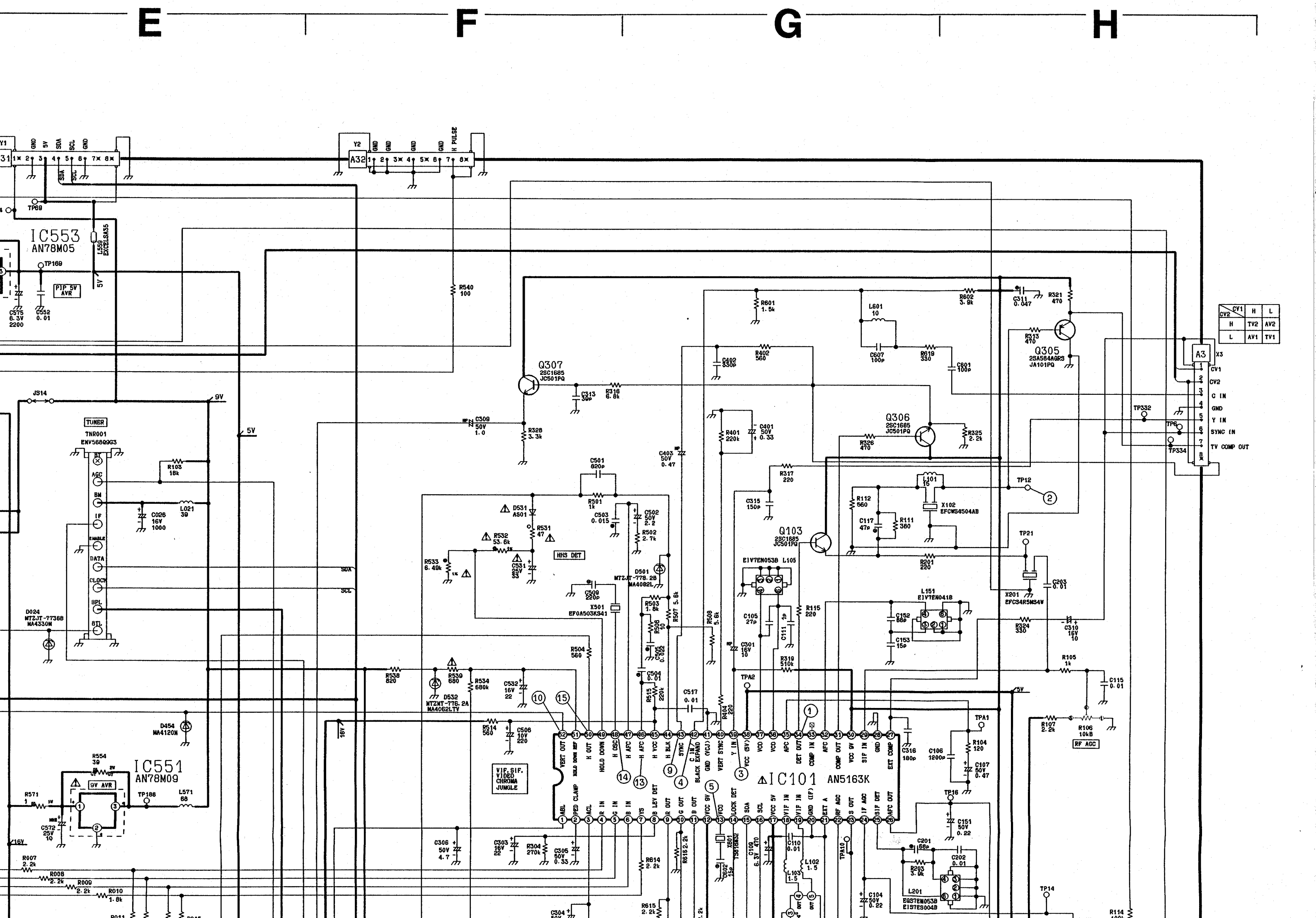
C D E F

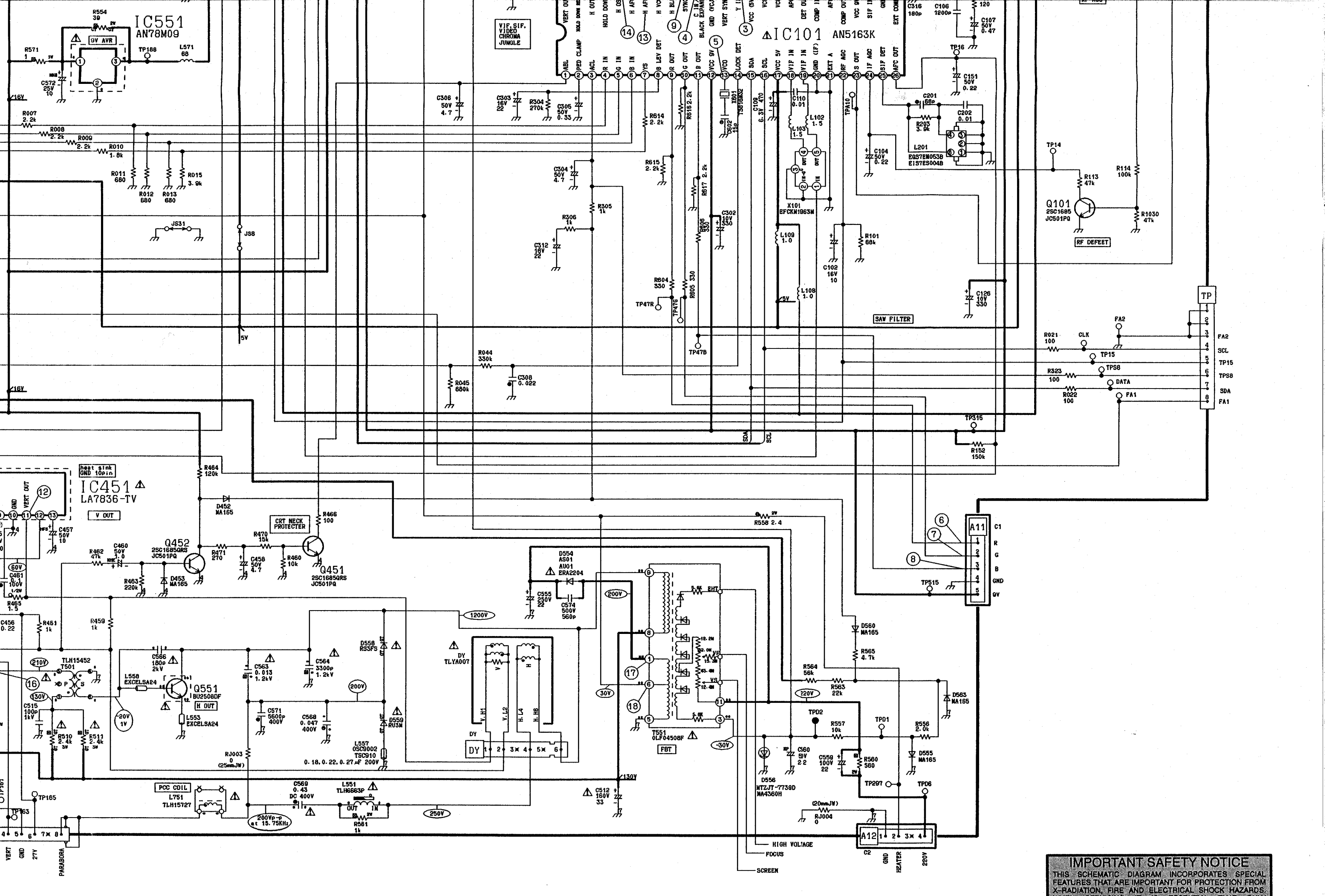
A–Board Schematic
CT–32G21U/UU/CU


TNPH0042AC
IC2201
AN5818NK
IIC GND
SDA
SCL
SAP LED
ST LED
PILOT DET
PLL FILTER
VCC
PILOT HYS
QUASI SIN
ST FILTER OUT
MPX IN
IdbX
V REF
SAP NOISE DET
SAP DET
L OUT
R OUT
dbX OUT
WB TIME
WB DET IN
GND
SPC DET IN
SPC TIME
SPECTRAL
L+R OUT
DEMOD OUT
dbX IN
TP107
TP104
TPE1
IC553
AN78M05
PIP 5V AVR
L559 EXCELSA35
TP64
TP69
TP169
Y1
A31
Y2
A32
GND
5V
SDA
SCL
H PULSE
IC1051
RPM-637CBRS1
TP135
TP143
L1051 150
J314
9V
5V
16V
TUNER
TNR001
ENV56809G3
AGC
BM
IF
ENABLE
DATA
CLOCK
BPL
BTL
L005 10
D024 MTZJT-7736B MA4330N
IC002
24LC02BIP
ROM
D004 MTZJ6.2C MTZJ6.2A MA4062
Q307
2SC1685 JC501PQ
D531 AS01
HHS DET
IC001
MPU
MN1873265T6F
REMOTE
AFC 1st
AFC 2nd/VER.
LOCK DET
KEY IN 1
ACTION/HHS
VIRSION
S-VHS
FA1
MTS IN
MODE
TEST OSC
BASS
TREBLE
BALANCE
SRND ON/OFF
AVDD (5V)
C REF
VPH
VCP
CVBS
GND
OSC1
OSC2
VDD (OSC)
SCL
SDA
CLK
DATA
V SYNC
RESET
PV1
PV2
ONTIMER
S DEFT
CV1
CY2
SP ON/OFF
VOLUME
OSD R
OSD G
OSD B
OSD BLK
H SYNC
X001 TSS2060MX
L007 JW
TPS1
TPS2
J534
D026 MA4062 MTZJ6.2A
D454 MA4120N
IC551
AN78M09
9V AVR
TP188
L571 68
D532 MTZNT-776.2A MA4062LTV
VIF, SIF, VIDEO CHROMA JUNGLE
VERT OUT
HOLD DOWN REF
PED CLAMP
ABL
EFO


AVDD (5V)
C REF
VPH
VCP
CVBS
CC GND
POWER
OSD R
OSD G
OSD B
OSD BLK
H SYNC
GND
S AGC ON/OFF
IF DEFT
RECHARGE
MNTRPOWER
PLL ENBL
Q001
2SA564A
JA101PQ
Q005
2SC1685
JC501PQ
H. PULSE BUFFER
OVER CURRENT PROTECTER
5V
16V
130V
12V
IC451
LA7836-TV
V OUT
heat sink GND 10pin
VCC1
VERT IN
RAMP GEN
GND
RAMP GEN
DRIVE
VCC2
PUMP UP
GND
VERT OUT
V. SIZE
CRT NECK PROTECTER
Q452
2SC1685QRS
JC501PQ
Q451
2SC1685QRS
JC501PQ
Q501
2SC4212H
H. DRIVE
Q551
BU2508DF
H OUT
Q753
2SD1266
PCC OUT
PCC COIL
L751
TLH15727
L551
TLH6663P
T501
TLH15452
T801
ETS39AG115AC
DRAIN
SORCE (OCP IN)
OCP LEVEL
FEED BACK
DRIVE
GND
ERR. AMP
V REF
DY
TLYA007
A7
GND
VERT
GND
27V
PARABORA
1200V
250V
200V
210V
360V
-40V
200Vp-p at 15.75KHz

Board Index
"A"–Board – Main Chassis

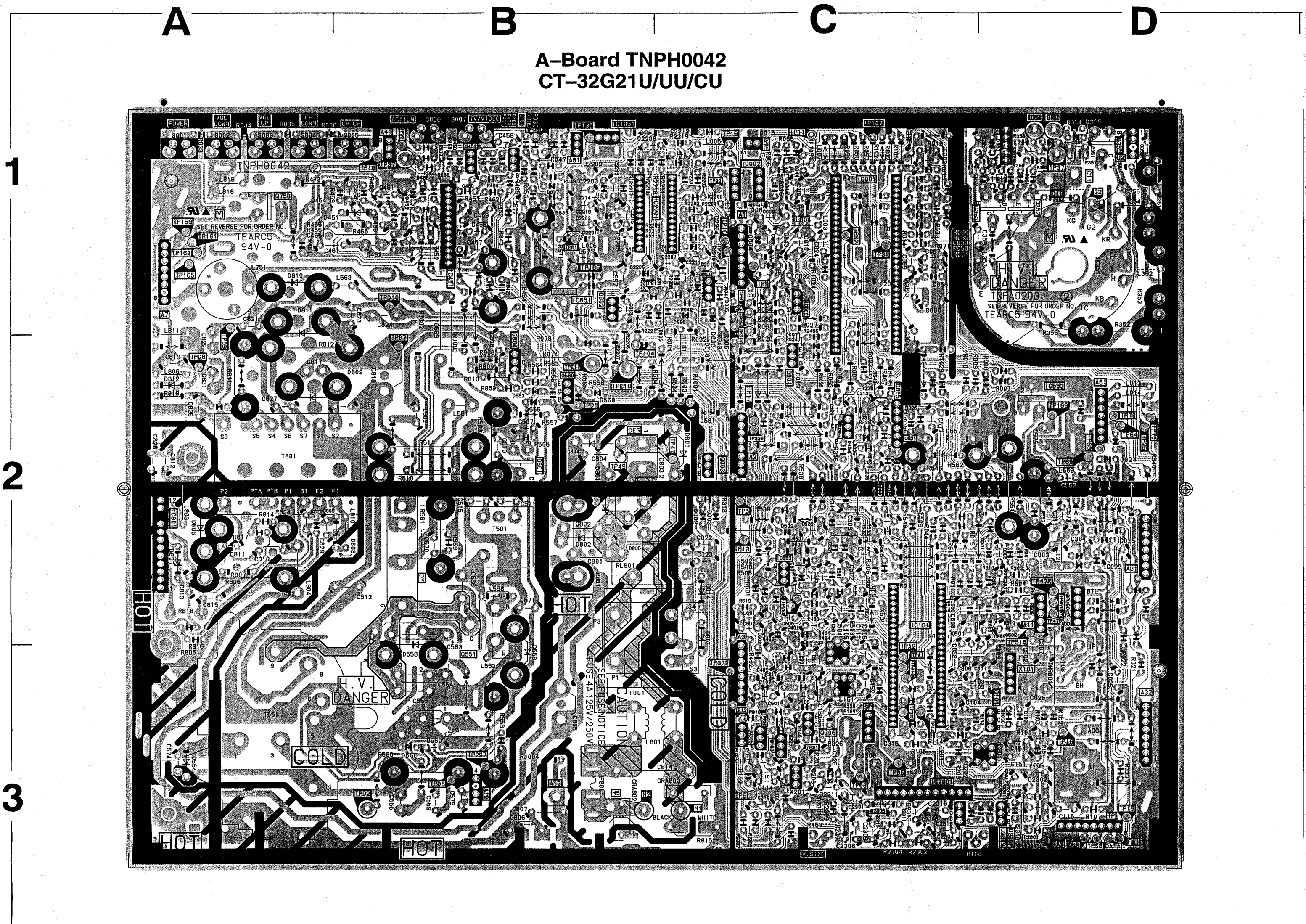

E
F
G
H
Y1
A31
GND
5V
SDA
SCL
GND
TP89
IC553
AN78M05
L559
EXCELSA35
TP169
PIP 5V AVR
5V
C575 6.3V 2200
C552 0.01
Y2
A32
GND
GND
GND
GND
H PULSE
R540 100
JS14
9V
5V
TUNER
TNR001
ENV56809G3
AGC
BM
IF
ENABLE
DATA
CLOCK
BPL
BTL
R103 18k
C026 16V 1000
L021 39
SDA
SCL
D024
MTZJT-77368
MA4330M
D454
MA4120M
R554 39
IC551
AN78M09
9V AVR
R571
TP188
L571 68
C572 25V 10
16V
R007 2.2k
R008 2.2k
R009 2.2k
R010 1.8k
Q307
2SC1685
JC501PQ
C313 39p
R316 6.8k
C309 50V 1.0
R328 3.3k
C501 820p
R501 1k
C503 0.015
C502 50V 2.2
R502 2.7k
D531 AS01
R531 47
R532 53.6k
R533 6.49k
C531 25V 33
HHS DET
D501
MTZJT-778.2B
MA4082L
C509 220p
X501
EF0A503KS41
R503 1.8k
R506 10
R507 5.6k
C505 0.022
C504 0.01
R515 220k
R504 560
C517 0.01
R508 5.6k
C403 50V 0.47
R401 220k
C401 50V 0.33
C402 630p
R402 560
C301 16V 10
R404 220
R538 820
D532
MTZMT-776.2A
MA4062LTV
R539 680
R534 680k
C532 16V 22
R514 560
C508 10V 220
VIF, SIF, VIDEO CHROMA JUNGLE
C306 50V 4.7
C303 16V 22
R304 270k
C305 50V 0.33
C304
R614 2.2k
R616 2.2k
R615 2.2k
X601
C602 15p
C109 6.3V 470
C110 0.01
L103 1.5
L102 1.5
TPA10
R601 1.5k
L601 10
C607 100p
R619 330
C601 100p
R602 3.9k
C311 0.047
R321 470
R313 470
Q305
2SA564AQRS
JA101PQ
Q306
2SC1685
JC501PQ
R326 470
R325 2.2k
R317 220
C315 150p
Q103
2SC1685
JC501PQ
E1V7EN053B L105
C105 27p
C111 1p
R115 220
R319 510k
R112 560
L101 15
X102
EFCWS4504AB
C117 47p
R111 360
R201 220
TP12
TP21
C203 0.01
X201
EFCS4R5MS4W
L151
E1V7EN041B
C152 68p
C153 15p
R324 330
C310 16V 10
R105 1k
C115 0.01
TPA2
5V
R107 2.2k
R106 10kB
RF AGC
TPA1
R104 120
C316 180p
C106 1200p
C107 50V 0.47
TP16
C151 50V 0.22
C201 68p
R203 3.9k
C202 0.01
L201
EQS7EN053B
EIS7ES004B
C104 50V 0.22
TP14
R114
IC101
AN5163K
VERT OUT
HOLD DOWN REF
H OUT
HOLD DOWN
H OSC
H AFC
H AFC
H VCC
H BLK
SYNC
C IN / EXPAND
BLACK EXPAND
GND (VCJ)
VERT SYNC
Y IN
VCC (5V)
VCO
VCO
APC
DET OUT
COMP IN
AFC
COMP OUT
VCC 9V
SIF IN
GND
EXT COMP
ABL
PED CLAMP
ACL
R IN
G IN
B IN
YS
B LEV DET
R OUT
G OUT
B OUT
VCC 9V
VCO
LOCK DET
SDA
SCL
VCC 5V
VIF IN
VIF IN
GND (IF)
EXT A
RF AGC
S OUT
IF AGC
SIF DET
AFC OUT
A3
X3
CV1
CV2
C IN
GND
Y IN
SYNC IN
TV COMP OUT
TP332
TP6
TP334
CV2 \ CV1 | H | L
H | TV2 | AV2
L | AV1 | TV1


IC551
AN78M09
9V AVR
R554 39
R571 1
C572 25V 10
TP186
L571 68
16V
R007 2.2k
R008 2.2k
R009 2.2k
R010 1.8k
R011 680
R012 680
R013 680
R015 3.9k
JS31
JS8
5V
VIF,SIF, VIDEO CHROMA JUNGLE
IC101 AN5163K
ABL
PED CLAMP
ACL
R IN
G IN
B IN
YS
B LEV DET
R OUT
G OUT
B OUT
VCC 9V
VCO
LOCK DET
SDA
SCL
VCC 5V
VIF IN
GND (IF)
EXT A
RF AGC
S OUT
IF AGC
SIF DET
AFC OUT
C306 50V 4.7
C303 16V 22
R304 270k
C305 50V 0.33
R614 2.2k
R616 2.2k
X601
C302 10V 330
C602 15p
C109 6.3V 470
C110 0.01
L102 1.5
L103 1.5
X101 EFCKM1963M
C316 180p
C106 1200p
C107 50V 0.47
TP16
C151 50V 0.22
C201 68p
C202 0.01
R203 3.9k
L201 EQS7EM0538 EIS7ES004B
C104 50V 0.22
TP14
R113 47k
R114 100k
Q101 2SC1685 JC501PQ
R1030 47k
RF DEFEET
C304 50V 4.7
R615 2.2k
R617 2.2k
R305 1k
R306 1k
C312 16V 22
R606 330
L109 1.0
R101 68k
C102 16V 10
R604 330
R605 330
TP47R
TP47G
L108 1.0
C126 10V 330
SAW FILTER
TP47B
R044 330k
C308 0.022
R045 680k
R021 100
CLK
FA2
TP15
R323 100
TPS8
DATA
R022 100
FA1
TP
SCL
SDA
TP316
R152 150k
SDA
SCL
IC451 LA7836-TV
heat sink GND 10pin
V OUT
VERT OUT
GND
C457 50V 10
R464 120k
D452 MA165
CRT NECK PROTECTER
R466 100
Q452 2SC1685QRS JC501PQ
R462 47k
C460 50V 1.0
R471 270
R470 15k
C458 50V 4.7
R460 10k
Q451 2SC1685QRS JC501PQ
R463 220k
D453 MA165
C461 0.1 100V
R465 1.5
C456 0.22
R461 1k
R459 1k
60V
R558 2.4
D554 AS01 AU01 ERA2204
C555 250V 22
C574 500V 560p
200V
1200V
A11
C1
R
G
B
GND
9V
TP515
TLH15452 T501
210V
130V
C515 100p 1kV
R510 2.4k 3W
R511 2.4k 3W
-20V 1V
L558 EXCELSA24
C566 180p 2kV
Q551 BU2508DF
H OUT
L553 EXCELSA24
C563 0.013 1.2kV
C564 3300p 1.2kV
200V
D558 RS3FS
C571 5600p 400V
C568 0.047 400V
D559 RU3M
L557 05C9002 TSC910
0.18, 0.22, 0.27µF 200V
RJ003 0 (25mmJW)
DY TLYA007
V
H
V.H1
V.L2
H.L4
H.H6
DY
30V
T551 OLF04508F
FBT
EHT
VS
D560 MA165
R565 4.7k
R564 56k
R563 22k
220V
D563 MA165
TPD2
TPD1
R557 10k
R556 2.0k
-30V
D556 MTZJT-7739D MA4360H
C560 50V 22
C559 100V 22
R560 560
D555 MA165
TP297
TPD6
130V
C512 160V 33
PCC COIL
L751 TLH15727
C569 0.43 DC 400V
L551 TLH6663P
OUT
IN
R561 1k
200Vp-p at 15.75KHz
250V
RJ004 0 (20mmJW)
A12
C2
GND
HEATER
220V
HIGH VOLTAGE
FOCUS
SCREEN
TP165
TP163
VERT
GND
27V
PARABORA

IMPORTANT SAFETY NOTICE

THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES THAT ARE IMPORTANT FOR PROTECTION FROM X-RADIATION, FIRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS DESIGNATED WITH ⚠ IN THE SCHEMATIC.

A–Board TNPH0042
CT–32G21U/UU/CU


A
B
C
D
1
2
3
POWER
VOL DOWN
VOL UP
CH DOWN
CH UP
ACTION
TV/VIDEO
TNPH0042
SEE REVERSE FOR ORDER NO.
TEARC5 94V-0
T801
T501
T551
H.V. DANGER
COLD
HOT
CAUTION
SEE FUSE NOTICE
FUSE 4A 125V/250V
TNFA0203
IC601
IC101
L801
T001
BLACK
WHITE

Voltage Measurements "A"–Board

IC001			
01	5.17	33	N.C
02	2.24	34	5.17
03	4.64	35	5.20
04	3.91	36	0.00
05	5.18	37	5.19
06	2.00	38	0.00
07	0.00	39	3.73
08	0.00	40	N.C
09	N.C	41	0.00
10	5.19	42	0.00
11	1.29	43	0.00
12	0.00	44	0.00
13	N.C	45	0.13
14	3.06	46	0.00
15	2.76	47	0.00
16	3.00	48	0.00
17	0.00	49	0.00
18	N.C	50	N.C
19	N.C	51	N.C
20	N.C	52	0.00
21	N.C	53	0.00
22	5.20	54	5.15
23	0.00	55	4.11
24	N.C	56	N.C
25	1.28	57	N.C
26	1.88	58	N.C
27	0.00	59	4.21
28	N.C	60	4.26
29	N.C	61	5.20
30	N.C	62**	2.50
31	5.14	63	2.51
32	N.C	64	0.00

**** WARNING**
CRT shuts off when probing pin. Shut Receiver off and turn back on to continue testing

IC101			
01	2.52	27	2.67
02	1.73	28	0.00
03	3.36	29	2.74
04	0.00	30	8.82
05	0.00	31	4.94
06	0.00	32	2.89
07	0.00	33	N.C
08	5.63	34	2.87
09	2.76	35	1.77
10	2.87	36	2.97
11	2.77	37	2.98
12	8.82	38	5.01
13	2.62	39	3.85
14	5.92	40	2.61
15	4.21	41	0.00
16	4.24	42	2.43
17	4.99	43	1.98
18	2.97	44	0.29
19	2.98	45	6.19
20	0.00	46	2.64
21	0.00	47	4.28
22	2.89	48	2.15
23	1.37	49	2.83
24	2.73	50	0.89
25	4.66	51	5.93
26	4.07	52	4.11

IC551	
01	16.72
02	0.00
03	8.96

IC553	
01	15.21
02	0.00
03	5.02

IC002	
01	0.00
02	0.00
03	0.00
04	0.00
05	4.20
06	4.25
07	0.00
08	5.19

IC552	
01	16.32
02	11.99
03	0.00

IC451	
01	12.29
02	4.11
03	6.21
04	0.00
05	6.25
06	5.82
07	25.6
08	1.74
09	N.C
10	0.00
11	15.54
12	25.9
13	5.21

IC2201			
01	0.00	15	3.82
02	4.21	16	4.45
03	4.25	17	4.52
04	2.11	18	4.55
05	0.00	19	0.65
06	5.86	20	4.65
07	2.71	21	0.00
08	8.88	22	4.62
09	N.C	23	0.63
10	4.47	24	4.52
11	4.48	25	4.31
12	4.34	26	4.54
13	3.20	27	5.15
14	4.47	28	5.46

IC2301	
01	1.26
02	0.00
03	17.83
04	0.00
05	0.00
06	1.25
07	9.40
08	17.00
09	0.00
10	18.08
11	17.00
12	9.40

IC801 ⏚	
01	–39.3
02	–32.6
03	0.00
04	0.25
05	N.C
06	1.78
07	–0.35
08	0.21
09	0.21
10	N.C
11	136.0
12	135.9

	Q001	Q002	Q003	Q004	Q005	Q101	Q103	Q305	Q306
B	5.18	5.82	0.75	4.96	–0.41	0.00	2.86	1.42	4.94
C	0.00	12.62	0.10	5.77	3.73	2.72	8.82	0.00	8.82
E	5.17	5.20	0.00	5.82	0.00	0.00	2.24	2.12	4.31

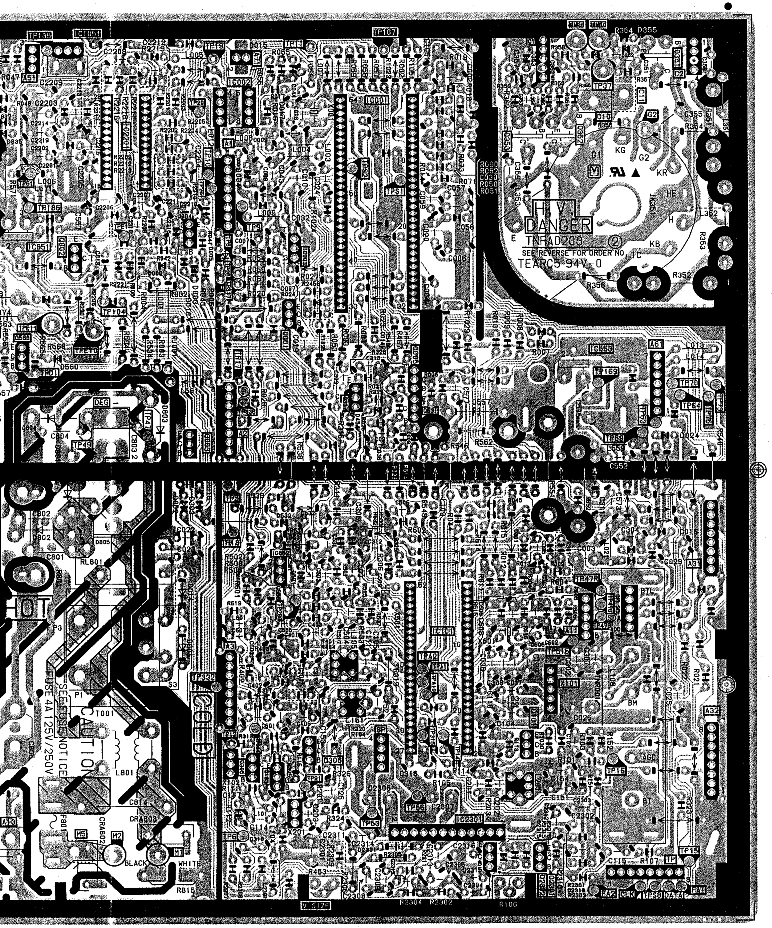
	Q307	Q451	Q452	Q501	Q551	Q753	Q2301	Q2302
B	4.27	0.00	0.16	0.31	–0.10	0.57	0.06	17.81
C	8.84	2.52	0.11	101.3	131.4	9.09	17.82	0.00
E	3.64	0.00	0.00	0.00	0.00	0.00	0.00	17.82

Voltage Measurements

1. Voltage measurement:
   - AC Input to the Receiver is 120V. NTSC generator is connected to the antenna of the Receiver. (Color bar pattern of 100IRE white and 7.5 IRE black.)
   - All Picture and Audio adjustments are set to Normalize.
     TV ANT/CABLE – (Set–Up Menu) in TV/ANT Mode
     Volume – Min
     TV/Video SW – TV position
     Audio Mode – Stereo
   - Voltage readings are nominal and may vary ±10% on active devices. Some voltage reading will vary with signal strength and picture content.
   - Supply voltages are all nominal.
2. Ground symbol ⏚ indicates ground lead connection of meter.

Caution: Incorrect ground connection will result in erroneous readings.

–Board TNPH0042
T–32G21U/UU/CU


H.V.
DANGER
TNRA0208 ②
SEE REVERSE FOR ORDER NO.
TEARC5 94V-0
HOT
COLD
CAUTION
SEE FUSE NOTICE
FUSE 4A 125V/250V
BLACK
WHITE

Schematic Notes

1. Resistors are carbon 1/4W unless noted otherwise.
2. Capacitors are ceramic 50V unless noted otherwise.
3. Coil value noted is inductance in µH.
4. Test point indicated by ●; Test point but no pin ○.
5. Components indicated with ⚠ are critical parts and replacement should be made with manufacture specified replacement parts only.
6. — **(BOLD LINE)** Indicates the route of B+ supply.
7. The schematic diagrams are current at the time of printing and are subject to change without notice.
8. Ground symbol ⏚ indicates **HOT GROUND CONNECTION;** ⏚ indicates COLD GROUND.

Note: *All other component symbols are used for engineering design purposes.*

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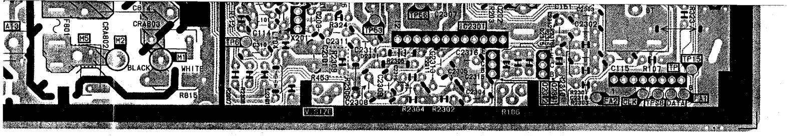


Voltage Measurements "A"–Board

I	
27	2.67
28	0.00
29	2.74
30	8.82
31	4.94
32	2.89
33	N.C
34	2.87
35	1.77
36	2.97
37	2.98
38	5.01
39	3.85
40	2.61
41	0.00
42	2.43
43	1.98
44	0.29
45	6.19
46	2.64
47	4.28
48	2.15
49	2.83
50	0.89
51	5.93
52	4.11

IC553	
01	15.21
02	0.00
03	5.02

01	
15	3.82
16	4.45
17	4.52
18	4.55
19	0.65
20	4.65
21	0.00
22	4.62
23	0.63
24	4.52
25	4.31
26	4.54
27	5.15
28	5.46

IC2301	
01	1.26
02	0.00
03	17.83
04	0.00
05	0.00
06	1.25
07	9.40
08	17.00
09	0.00
10	18.08
11	17.00
12	9.40

IC801 ⏚	
01	–39.3
02	–32.6
03	0.00
04	0.25
05	N.C
06	1.78
07	–0.35
08	0.21
09	0.21
10	N.C
11	136.0
12	135.9

	Q001	Q002	Q003	Q004	Q005	Q101	Q103	Q305	Q306
B	5.18	5.82	0.75	4.96	–0.41	0.00	2.86	1.42	4.94
C	0.00	12.62	0.10	5.77	3.73	2.72	8.82	0.00	8.82
E	5.17	5.20	0.00	5.82	0.00	0.00	2.24	2.12	4.31

	Q307	Q451	Q452	Q501	Q551	Q753	Q2301	Q2302
B	4.27	0.00	0.16	0.31	–0.10	0.57	0.06	17.81
C	8.84	2.52	0.11	101.3	131.4	9.09	17.82	0.00
E	3.64	0.00	0.00	0.00	0.00	0.00	0.00	17.82

Voltage Measurements

1. Voltage measurement:
   - AC input to the Receiver is 120V. NTSC generator is connected to the antenna of the Receiver. (Color bar pattern of 100IRE white and 7.5 IRE black.)
   - All Picture and Audio adjustments are set to Normalize.
     TV ANT/CABLE – (Set–Up Menu) in TV/ANT Mode
     Volume – Min
     TV/Video SW – TV position
     Audio Mode – Stereo
   - Voltage readings are nominal and may vary ±10% on active devices. Some voltage reading will vary with signal strength and picture content.
   - Supply voltages are all nominal.
2. Ground symbol ⏚ indicates ground lead connection of meter.

Caution: Incorrect ground connection will result in erroneous readings.

Note: Stereo Models

The Functions listed below are activated by a DC voltage cha
Inputs(Pin 5 and 6) of MPU IC001. Press and hold a function b
Receiver to measure voltages.

FUNCTION	PIN 5	PIN 6
POWER	0.000V~0.444V	NO INPU
	NO INPUT	3.929V~4 4.556V~5
VOL ◀	0.796V~1.071V	NO INPU
VOL ▶	1.423V~1.697V	NO INPU
CH ▼	2.049V~2.324V	NO INPU
CH ▲	2.676V~2.951V	NO INPU
TV/VIDEO	3.303V~3.577V	NO INPU
ACTION	NO INPUT	0.000V~

The AUDIO MODES being broadcast are displayed on screen
the voltage change to DAC input (Pin 9) of MPU IC001.

AUDIO MODE BROADCAST	PIN 9
MONO	3.774V~
SAP	2.207V~
STEREO	0.953V~
STEREO & SAP	0.000V~

Schematic Notes

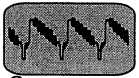
1. Resistors are carbon 1/4W unless noted otherwise.
2. Capacitors are ceramic 50V unless noted otherwise.
3. Coil value noted is inductance in µH.
4. Test point indicated by ●; Test point but no pin ○.
5. Components indicated with ⚠ are critical parts and replacement should be made with manufacture specified replacement parts only.
6. — (BOLD LINE) indicates the route of B+ supply.
7. The schematic diagrams are current at the time of printing and are subject to change without notice.
8. Ground symbol ⏚ indicates **HOT GROUND CONNECTION**; ⊥ indicates COLD GROUND.

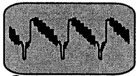
Note: *All other component symbols are used for engineering design purposes.*

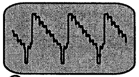
IMPORTANT SAFETY NOTICE

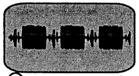
THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES THAT ARE IMPORTANT FOR PROTECTION FROM X-RADIATION, FIRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS DESIGNATED WITH ⚠ IN THE SCHEMATIC.

Waveforms – A-Board


① **1.5V p–p [20µs]**
IC101 PIN 34 (DET OUT)
Schem. Loc. G–3

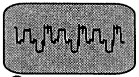

② **0.8V p–p [20µs]**
TP12
Schem. Loc. H–2

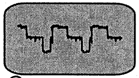

③ **0.5V p–p [20µs]**
IC101 PIN 39 (Y IN)
Schem. Loc. G–3

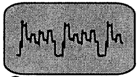

④ **0.3V p–p [20µs]**
IC101 PIN 42 (C IN)
Schem. Loc. G–3

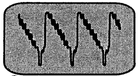
3.58MHz X'tal

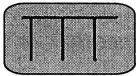
⑤ IC101 PIN 13
3.58VCO
OSC Waveform

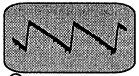

⑥ **4.2V p–p [20µs]**
A11 PIN 1 (R)
Schem. Loc. G–5

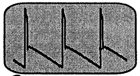

⑦ **3.8V p–p [20µs]**
A11 PIN 2 (G)
Schem. Loc. G–5

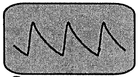

⑧ **3.7V p–p [20µs]**
A11 PIN 3 (B)
Schem. Loc. G–5


⑨ **1.1V p–p [20µs]**
IC101 PIN 43 (SYNC)
Schem. Loc. G–3


⑩ **4.3V p–p [5ms]**
IC101 PIN 52 (VERT OUT)
Schem. Loc. F–3

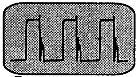

⑪ **2.0V p–p [5ms]**
IC451 PIN 6 (DRIVE)
Schem. Loc. D–4

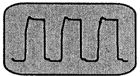

⑫ **52.4V p–p [5ms]**
IC451 PIN 11 (VERT OUT)
Schem. Loc. E–4

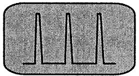

⑬ **1.7V p–p [20µs]**
IC101 PIN 46 (H AFC)
Schem. Loc. G–3

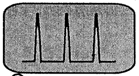
503KHz X'tal

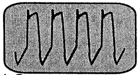
⑭ IC101 PIN 48
H OSC
OSC Waveform

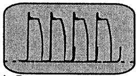

⑮ **2.4V p–p [20µs]**
IC101 PIN 50 (H OUT)
Schem. Loc. F–3


⑯ **186V p–p [20µs]**
Q501 collector (H DRIVE)
Schem. Loc. E–5


⑰ **258V p–p [20µs]**
T551 PIN 1
Schem. Loc. G–5


⑱ **29V p–p [20µs]**
T551 PIN 6
Schem. Loc. G–5


⏚⑲ **13.4V p–p [5µs]**
IC801 PIN 4
Schem. Loc. B–5


⏚⑳ **275V p–p [5µs]**
IC801 PIN 11
Schem. Loc. B–5

Waveform Measurements

1. ③ Indicates waveform measurement. (Measurement can be taken at the best accessible location in common to the indicated point.)
2. Taken with a NTSC signal generator connected to the antenna terminal.
5. Ground symbol ⏚ shown on waveform number indicates (Hot) ground lead connection of the Oscilloscope.
CAUTION: Incorrect ground connection of the test equipment will result in erroneous readings.

A11 PIN 2 (G)
Schem. Loc. G–5

H OSC
OSC Waveform

Waveform Measurements

1. ③ indicates waveform measurement. (Measurement can be taken at the best accessible location in common to the indicated point.)
2. Taken with a NTSC signal generator connected to the antenna terminal. (NTSC color bar pattern of 8 bars of EIA colors, 100 IRE white and 7.5 IRE black.)
3. Customer Controls (Picture/Audio Menu) are set to Normalize. Volume is set to "MIN".
4. All video and color waveforms are taken with a wideband scope and a probe with low capacitance (10 to 1). Shape and peak amplitudes may vary depending on the type of Oscilloscope used and its settings.
5. Ground symbol ⏚ shown on waveform number indicates (Hot) ground lead connection of the Oscilloscope.
   CAUTION: Incorrect ground connection of the test equipment will result in erroneous readings.

The waveforms are taken in the order of circuit flow through the various sections as follows:

VIDEO – Waveforms 1~2
COLOR – Waveforms 3~9
VERTICAL – Waveforms 10~15
HORIZONTAL – Waveforms 16~20
CRT DRIVE – Waveforms 21 & 22
PIP – Waveforms 23~30 (PIP On)

Tuner Voltage Chart

Enable, Data, and Clock have no DC readings. They are digital signals from the MPU.

NOTE: Voltage at the 30V test pin varies with channel selection. Refer to chart for sample tuning voltages of TV/CATV(CABLE) channels as shown.

Voltage Reading Are Nominal And May Vary ± 15%

– VHF –	
Ch. 02	4.0V
Ch. 06	8.2V
Ch. 07	7.0V
Ch. 13	9.3V

– UHF –	
Ch. 14	7.7V
Ch. 69	24V

– CABLE –					
1st Band		2nd Band		3rd Band	
Ch. 1	6.7V	Ch. 16	4.5V	Ch. 47	3.7V
Ch. 15	24.7V	Ch. 46	2.70V	Ch. 94	14.9V
Ch. 95	9.8V			Ch. 100	15.1V
Ch. 99	17.5V			Ch. 125	24.0V

MICROPROCESSOR PROGRAMMING FOR BAND TUNING/SWITCHING

54MHz ←→ 130MHz ←→ 360MHz ←→ 806MHz

	FIRST TUNING BAND	SECOND TUNING BAND	THIRD TUNING BAND
VHF	02~06	07~13	
UHF	·		14~69
CABLE	01~06,14, 15, 95~99	07~13, 16~46	47~94, 100~125

NOTE: CABLE channel numbers as recommended by the joint EIA/NCTA Engineering Committee and published as EIA INTERIM STANDARD NO. 6 – CABLE TELEVISION CHANNEL IDENTIFICATION PLAN – MAY 1983.

Note: Stereo Models

The Functions listed below are activated by a DC voltage change to DAC Inputs(Pin 5 and 6) of MPU IC001. Press and hold a function button on the Receiver to measure voltages.

FUNCTION	PIN 5	PIN 6
POWER	0.000V~0.444V	NO INPUT
	NO INPUT	3.929V~4.204V
		4.556V~5.000V
VOL ◀	0.796V~1.071V	NO INPUT
VOL ▶	1.423V~1.697V	NO INPUT
CH ▼	2.049V~2.324V	NO INPUT
CH ▲	2.676V~2.951V	NO INPUT
TV/VIDEO	3.303V~3.577V	NO INPUT
ACTION	NO INPUT	0.000V~0.444V

The AUDIO MODES being broadcast are displayed on screen in red by the voltage change to DAC input (Pin 9) of MPU IC001.

AUDIO MODE BROADCAST	PIN 9
MONO	3.774V~5.000V
SAP	2.207V~3.420V
STEREO	0.953V~1.853V
STEREO & SAP	0.000V~0.600V

A–Board Layout, Waveforms, Voltages & Misc. Notes

Sheet 1 of 1
Side B

MTC960645A1
B5